JOURNAL

AND

PROCEEDINGS

OF THE

ROYAL SOCIETY

OF

NEW SOUTH WALES,

1881.

INCORPORATED 1881.

VOL. XV.

EDITED BY

A. LIVERSIDGE,

Professor of Chemistry and Mineralogy in the University of Sydney.

THE AUTHORS OF PAPERS ARE ALONE RESPONSIBLE FOR THE STATEMENTS MADE AND THE OPINIONS EXPRESSED THEREIN.

AGENTS FOR THE SOCIETY
Messrs. Trübner & Co., 57, Ludgate Hill, London, E.C.

SYDNEY: THOMAS RICHARDS, GOVERNMENT PRINTER.

1882.

NOTICE.

The Smithsonian Institute, Washington, U.S.A., and Messrs. Trübner & Co., 57, Ludgate Hill, London, have kindly undertaken to receive and forward parcels of books and printed matter intended for the Society.

Donations to the Building Fund of the Royal Society of New South Wales.

	£	s.	d.	£	s.	d.
Contributions as per original list				1,064	14	0
„ during 1880...				108	3	0

1881.

	£	s.	d.	£	s.	d.
Abbott, J. P.	1	1	0			
Brindley, Thomas	1	1	0			
Brown, H. J.	1	1	0			
Dixon, W. A. (total donation, £5 5s.)	1	1	0			
De Salis, L. W., jun. (total donation, £11 1s.) ...	1	1	0			
Griffiths, F. C. (total donation, £10 5s.) ...	5	5	0			
Hirst, G. D.	1	1	0			
Hunt, Robert (total donation, £7 7s.)	1	1	0			
Leibius, Dr. (total donation, £7 7s.)	1	1	0			
Liversidge, Professor (total donation, £12 2s.) ...	1	1	0			
Mann, J. F.	3	3	0			
Moore, Charles (total donation, £7 2s.)	1	1	0			
Russell, H. C., B.A. (total donation, £14 4s.) ...	1	1	0			
Smith, The Hon. J., C.M.G., &c. (total donation, £6 1s.)	1	1	0			
Ward, J. W. (total donation, £11 6s.)	2	2	0			
Wilkinson, C. S. (total donation, £7 7s.) ...	1	1	0			
Wright, H. G. A., M.R.C.S.E. (total donation, £7 7s.)	1	1	0			
				25	4	0
				£1,198	1	0

Annual Subscriptions promised.

	£	s.	d.
Dixon, W. A., F.C.S.	1	1	0
Hirst, G. D.	1	1	0
Hunt, Robert, F.G.S., &c.	1	1	0
Leibius, Dr., F.C.S., &c.	1	1	0
Liversidge, Professor, F.C.S., &c.	1	1	0
Makin, G. E.	1	1	0
Moore, Charles, F.L.S.	1	1	0
Russell, H. C., B.A., F.R.A.S., &c.	1	1	0
Smith, The Hon. J., C.M.G., &c.	1	1	0
Wilkinson, C. S., F.G.S.	1	1	0
Wright, H. G. A., M.R.C.S.E.	1	1	0

A

Contributions from the Members of the Royal Society of New South Wales to the Biological Laboratory, Sydney.

	£	s.	d.	£	s.	d.
Abbott, J. P.	1	1	0			
Bundock, W. C.	2	2	0			
Giblin, V. W.	1	1	0			
Hunt, Robt., F.G.S.	1	1	0			
Jones, James...	1	1	0			
Knox, Edward	5	0	0			
Leibius, Dr.	1	1	0			
Nowlan, John	3	3	0			
Quaife, Dr.	1	1	0			
Russell, H. C., B.A.	2	2	0			
Starkey, J. T.	2	2	0			
Thompson, T. J., & Son	2	2	0			
Webster, A. S.	1	1	0			
				23	18	0
Contribution from the Society's Funds				25	0	0
				£48	18	0

ROYAL SOCIETY OF NEW SOUTH WALES.

JOURNAL

AND

PROCEEDINGS

OF THE

ROYAL SOCIETY

OF

NEW SOUTH WALES,

1881.

INCORPORATED 1881.

VOL. XV.

EDITED BY

A. LIVERSIDGE,

Professor of Chemistry and Mineralogy in the University of Sydney.

THE AUTHORS OF PAPERS ARE ALONE RESPONSIBLE FOR THE STATEMENTS MADE AND THE OPINIONS EXPRESSED THEREIN.

AGENTS FOR THE SOCIETY:

Messrs. Trübner & Co., 57, Ludgate Hill, London, E.C.

SYDNEY: THOMAS RICHARDS, GOVERNMENT PRINTER

1882.

NOTICE.

The Royal Society of New South Wales originated in 1821 as the "Philosophical Society of Australasia"; after an interval of inactivity, it was resuscitated in 1850, under the name of the "Australian Philosophical Society," by which title it was known until 1856, when the name was changed to the "Philosophical Society of New South Wales"; and finally, in 1866, by the sanction of Her Most Gracious Majesty the Queen, it assumed its present title.

CONTENTS.

VOLUME XV.

The Royal Society of New South Wales.

OFFICERS FOR 1881–82.

HONORARY PRESIDENT:

HIS EXCELLENCY THE RT. HON. LORD AUGUSTUS LOFTUS,
G.C.B., &c., &c., &c.

PRESIDENT:

H. C. RUSSELL, B.A., F.R.A.S., F.M.S., &c.

VICE-PRESIDENTS:

CHRISTOPHER ROLLESTON, C.M.G.
HON. J. SMITH, C.M.G., M.L.C., M.D., LL.D., &c.

HONORARY TREASURER:

H. G. A. WRIGHT, M.R.C.S., E.

HONORARY SECRETARIES:

PROFESSOR LIVERSIDGE. | DR. ADOLPH LEIBIUS.

COUNCIL:

DIXON, W. A., F.C.S.	MANNING, F. N., M.D.
HIRST, G. D.	MOORE, C., F.L.S.
HUNT, ROBERT, F.G.S.	WILKINSON, C. S., F.G.S.

ASSISTANT SECRETARY

W. H. WEBB.

ROYAL SOCIETY OF NEW SOUTH WALES INCORPORATION.

An Act to incorporate a Society called "The Royal Society of New South Wales." [16 December, 1881.]

WHEREAS a Society called (with the sanction of Her Most Gracious Majesty the Queen) "The Royai Society of New South Wales" has under certain rules and by-laws been formed at Sydney in the Colony of New South Wales for the encouragement of studies and investigations in Science Art Literature and Philosophy And whereas the Council of the said Society is at the present time composed of the following office-bearers and members His Excellency the Right Honorable Lord Augustus Loftus P.C. G.C.B. Honorary President The Honorable John Smith C.M.G. M.D. LL.D. President and Charles Moore Esquire F.L.S. Director of the Botanic Gardens Sydney and Henry Chamberlaine Russell Esquire B.A. (Sydney) F.R.A.S. F.M.S. London Government Astronomer for New South Wales Vice-Presidents and H. G. A. Wright Esquire M.R.C.S. Honorary Treasurer Archibald Liversidge Esquire Associate of the Royal School of Mines London Fellow of the Institute of Chemistry of Great Britain and Ireland and Professor of Geology and Mineralogy in the University of Sydney and Carl Adolph Leibius Esquire Doctor of Philosophy of the University of Heidelberg Fellow of the Institute of Chemistry of Great Britain and Ireland Honorary Secretaries W. A. Dixon Fellow of the Institute of Chemistry of Great Britain and Ireland G. D. Hirst Esquire Robert Hunt Esquire Associate of the Royal School of Mines London Deputy Master Sydney Branch Royal Mint Eliezer L. Montefiore Esquire Christopher Rolleston Esquire C.M.G. Preamble

Charles Smith Wilkinson Esquire Government Geologist Members of the Council And whereas it is expedient that the said Society should be incorporated and should be invested with the powers and authorities hereinafter contained Be it therefore enacted by the Queen's Most Excellent Majesty by and with the advice and consent of the Legislative Council and Legislative Assembly of New South Wales in Parliament assembled and by the authority of the same as follows :—

Interpretation clause.

1. For the purposes of this Act the following words in inverted commas shall unless the context otherwise indicate bear the meaning set against them respectively—

"Corporation" the Society hereby incorporated

"Council" the Members of the Council at any duly convened meeting thereof at which a quorum according to the by-laws at the time being shall be present

"Secretary" such person or either one of such persons who shall for the time being be the Secretary or Secretaries honorary or otherwise of the said Society (saving and excepting any Assistant Secretary of the said Society).

Incorporation clause.

2. The Honorary President the President Vice-Presidents Officers and Members of the said Society for the time being and all persons who shall in manner provided by the rules and by-laws for the time being of the said Society become members thereof shall be for the purposes hereinafter mentioned a body corporate by the name or style of "The Royal Society of New South Wales" and by that name shall and may have perpetual succession and a common seal and shall and may enter into contracts and sue and be sued plead and be impleaded answer and be answered unto defend and be defended in all Courts and places whatsoever and may prefer lay and prosecute any indictment information and prosecution against any person whomsoever and any summons or other writ and any notice or other proceeding which it may be requisite to serve upon the Corporation may be served upon the Secretary or one of the Secretaries as the case may be or if there be no Secretary or if the Secretaries or Secretary be absent from the Colony then upon the President or either of the Vice-Presidents.

Rules and By-laws.

3. The present rules and by-laws of the said Society shall be deemed and considered to be and shall be the rules and by-laws of the said Corporation save and except in so far as any of them are or shall or may be altered varied or repealed under the powers for that purpose therein contained or are

or may be inconsistent or incompatible with or repugnant to any of the provisions of this Act or any of the laws now or hereafter to be in force in the said Colony.

4. The Corporation shall have power to purchase acquire and hold lands and any interest therein and also to sell and dispose of the said lands or any interest therein and all lands tenements hereditaments and other property of whatever nature now belonging to the said Society under the said rules and by-laws or vested in Trustees for them shall on the passing of this Act be vested in and become the property of the said Corporation subject to all charges claims and demands in anywise affecting the same. Power to acquire and hold and to sell lands &c.

5. The ordinary business of the Corporation in reference to its property shall be managed by the Council and it shall not be lawful for individual members to interfere in any way in the management of the affairs of the Corporation except as by the rules and by-laws for the time being shall be specially provided. Ordinary business to be managed by the Council.

6. The Council shall have the general management and superintendence of the affairs of the Corporation and excepting the appointment of President and Vice-Presidents and other honorary officers who shall be appointed as the by-laws of the Society shall from time to time provide the Council shall have the appointment of all officers and servants required for carrying out the purposes of the Society and of preserving its property and it may also define the duties and fix the salaries of all officers Provided that if a vacancy shall occur in the Council during any current year of the Society's proceedings it shall be lawful for the Council to elect a member of the Society to fill such vacancy for the unexpired portion of the then current year The Council may also purchase or rent land houses or offices and erect buildings or other structures for any of the purposes for which the Society is hereby incorporated and may borrow money for the purposes of the Corporation on mortgages of the real and chattel property of the Corporation or any part thereof or may borrow money without security provided that the amount so borrowed without security shall never exceed in the aggregate the amount of the income of the Corporation for the last preceding year and the Council may also settle and agree to the covenants powers and authorities to be contained in the securities aforesaid. Powers of Council.

7. In the event of the funds and property of the Corporation being insufficient to meet its engagements each member thereof shall in addition to his subscription for the Liability of members.

then current year be liable to contribute a sum equal thereto towards the payment of such engagements but shall not be otherwise individually liable for the same and no member who shall have commuted his annual subscription shall be so liable for any amount beyond that of one year's subscription.

Custody of common seal.

8. The Council shall have the custody of the common seal of the Corporation and have power to use the same in the affairs and business of the Corporation and for the execution of any of the securities aforesaid and may under such seal authorize any person without such seal to execute any deed or deeds and do such other matter as may be required to be done on behalf of the Corporation but it shall not be necessary to use the said seal in respect of the ordinary business of the Corporation nor for the appointment of their Secretaries Solicitor or other officers.

Certified copy of rules and by-laws to be evidence.

9. The production of a printed or written copy of the rules and by-laws of the Corporation certified in writing by the Secretary or one of the Secretaries as the case may be to be a true copy and having the common seal of the Corporation affixed thereto shall be conclusive evidence in all Courts of such rules and by-laws and of the same having been made under the authority of this Act.

Elections not made in due time may be made subsequently.

10. In case any of the elections directed by the rules and by-laws for the time being of the Corporation to be made shall not be made at the times required it shall nevertheless be competent to the Council or to the members as the case may be to make such elections respectively at any ordinary meeting of the Council or at any annual or special general meeting held subsequently.

Secretary may represent Corporation for certain purposes.

11. The Secretary or either one of the Secretaries may represent the Corporation in all legal and equitable proceedings and may for and on behalf of the Corporation make such affidavits and do such acts and sign such documents as are or may be required to be done by the plaintiff or complainant or defendant respectively in any proceedings to which the Corporation may be parties.

INDEX TO RULES.

B

RULES.

(Revised October 1st, 1879.)

Object of the Society.

I. The object of the Society is to receive at its stated meetings original papers on Science, Art, Literature, and Philosophy, and especially on such subjects as tend to develop the resources of Australia, and to illustrate its Natural History and Productions.

Honorary President.

II. The Governor of New South Wales shall be *ex officio* Honorary President of the Society.

Other Officers.

III. The other Officers of the Society shall consist of a President, who shall hold office for one year only, but shall be eligible for re-election after the lapse of one year; two Vice-Presidents, a Treasurer, and one or more Secretaries, who, with six other Members, shall constitute a Council for the management of the affairs of the Society.

Election of Officers and Council.

IV. The President, Vice-Presidents, Secretaries, Treasurer, and the six other Members of Council, shall be elected annually by ballot at the General Meeting in the month of May.

V. It shall be the duty of the Council each year to prepare a list containing the names of members whom they recommend for election to the respective offices of President, Vice-Presidents, Hon. Secretaries and Hon. Treasurer, together with the names of six other members whom they recommend for election as ordinary members of Council.

The names thus recommended shall be proposed at one meeting of the Council, and agreed to at a subsequent meeting.

Such list shall be suspended in the Society's Rooms, and a copy hall be sent to each ordinary member not less than fourteen days before the day appointed for the Annual General Meeting.

VI. Each member present at the Annual General Meeting shall have the power to alter the list of names recommended by the Council, by adding to it the names of any eligible members not already included in it and removing from it an equivalent number of names, and he shall use this list with or without such alterations as a balloting list at the election of Officers and Council.

The name of each member voting shall be entered into a book, kept for that purpose, by two Scrutineers elected by the members present.

No ballot for the election of Members of Council, or of New Members, shall be valid unless twenty members at least shall record their votes.

Vacancies in the Council during the year.

VII. Any vacancies occurring in the Council of Management during the year may be filled up by the Council.

Candidates for admission.

VIII. Candidates must be at least twenty-one years of age.

Every candidate for admission as an ordinary member of the Society shall be recommended according to a prescribed form of certificate by not less than three members, to two of whom the candidate must be personally known.

Such certificate must set forth the names, place of residence, and qualifications of the candidate.

The certificate shall be read at the three Ordinary General Meetings of the Society next ensuing after its receipt, and during the intervals between those three meetings, it shall be suspended in a conspicuous place in one of the rooms of the Society.

The vote as to admission shall take place by ballot, at the Ordinary General Meeting at which the certificate is appointed to be read the third time, and immediately after such reading.

At the ballot the assent of at least four-fifths of the members voting shall be requisite for the admission of the candidate.

Entrance Fee and Subscriptions.

IX. The entrance money paid by members on their admission shall be Two Guineas; and the annual subscription shall be Two Guineas, payable in advance; but members elected prior to December, 1879, shall be required to pay an annual subscription of One Guinea only as heretofore.

The amount of ten annual payments may be paid at any time as a life composition for the ordinary annual payment.

New Members to be informed of their election.

X. Every new member shall receive due notification of his election, and be supplied with a copy of the obligation (No. 3 in Appendix), together with a copy of the Rules of the Society, a list of members, and a card of the dates of meeting.

Members shall sign Rules—Formal admission.

XI. Every member who has complied with the preceding Rules shall at the first Ordinary General Meeting at which he shall be present sign a duplicate of the aforesaid obligation in a book to be kept for that purpose, after which he shall be presented by some member to the Chairman, who, addressing him by name, shall say:—"In the name of the Royal Society of New South Wales I admit you a member thereof."

Annual subscriptions, when due.

XII. Annual subscriptions shall become due on the 1st of May for the year then commencing. The entrance fee and first year's subscription of a new member shall become due on the day of his election.

Members whose subscriptions are unpaid not to enjoy privileges.

XIII. An elected member shall not be entitled to attend the meetings or to enjoy any privilege of the Society, nor shall his name be printed in the list of the Society, until he shall have paid his admission fee and first annual subscription, and have returned to the Secretaries the obligation signed by himself.

Subscriptions in arrears.

XIV. Members who have not paid their subscriptions for the current year, on or before the 31st of May, shall be informed of the fact by the Hon. Treasurer.

No member shall be entitled to vote or hold office while his subscription for the previous year remains unpaid.

The name of any member who shall be two years in arrears with his subscriptions shall be erased from the list of members, but such member may be re-admitted on giving a satisfactory explanation to the Council, and on payment of arrears.

At the meeting held in July, and at all subsequent meetings for the year, a list of the names of all those members who are in arrears with their annual subscriptions shall be suspended in the Rooms of the Society. Members shall in such cases be informed that their names have been thus posted.

Resignation of Members.

XV. Members who wish to resign their membership of the Society are requested to give notice in writing to the Honorary Secretaries, and are required to return all books or other property belonging to the Society.

Expulsion of Members.

XVI. A majority of members present at any ordinary meeting shall have power to expel an obnoxious member from the Society, provided that a resolution to that effect has been moved and seconded at the previous ordinary meeting, and that due notice of the same has been sent in writing to the member in question, within a week after the meeting at which such resolution has been brought forward.

Honorary Members.

XVII. The Honorary Members of the Society shall be persons who have been eminent benefactors to this or some other of the Australian Colonies, and distinguished patrons and promoters of the objects of the Society. Every person proposed as an Honorary Member must be recommended by the Council and elected by the Society. Honorary Members shall be exempted from payment of fees and contributions: they may attend the meetings of the Society, and they shall be furnished with copies of the publications of the Society, but they shall have no right to hold office, to vote, or otherwise interfere in the business of the Society.

The number of Honorary Members shall not at any one time exceed twenty, and not more than two Honorary Members shall be elected in any one year.

Corresponding Members.

XVIII. Corresponding Members shall be persons, not resident in New South Wales, of eminent scientific attainments, who may have furnished papers or otherwise promoted the objects of the Society.

Corresponding Members shall be recommended by the Council, and be balloted for in the same manner as ordinary Members.

Corresponding Members shall possess the same privileges only as Honorary Members.

The number of Corresponding Members shall not exceed twenty-five, and not more than three shall be elected in any one year.

Ordinary General Meetings.

XIX. An Ordinary General Meeting of the Royal Society, to be convened by public advertisement, shall take place at 8 p.m., on the first Wednesday in every month, during the last eight months of the year; subject to alteration by the Council with due notice.

Order of Business.

XX. At the Ordinary General Meetings the business shall be transacted in the following order, unless the Chairman specially decide otherwise:—

1—Minutes of the preceding Meeting.
2—New Members to enrol their names and be introduced.
3—Ballot for the election of new Members.
4—Candidates for membership to be proposed.
5—Business arising out of Minutes.
6—Communications from the Council.
7—Communications from the Sections.
8—Donations to be laid on the Table and acknowledged.
9—Correspondence to be read.
10—Motions from last Meeting.
11—Notices of Motion for the next Meeting to be given in.
12—Papers to be read.
13—Discussion.
14—Notice of Papers for the next Meeting.

Annual General Meeting.—Annual Reports.

XXI. A General Meeting of the Society shall be held annually in May, to receive a Report from the Council on the state of the Society, and to elect Officers for the ensuing year. The Treasurer shall also at this meeting present the annual financial statement.

Admission of Visitors.

XXII. Every ordinary member shall have the privilege of introducing two friends as visitors to an Ordinary General Meeting of the Society or its Sections, on the following conditions:—

1. That the name and residence of the visitors, together with the name of the member introducing them, be entered in a book at the time.
2. That they shall not have attended two consecutive meetings of the Society or of any of its Sections in the current year.

The Council shall have power to introduce visitors, irrespective of the above restrictions.

Council Meetings.

XXIII. Meetings of the Council of Management shall take place on the last Wednesday in every month, and on such other days as the Council may determine.

Absence from Meetings of Council.—Quorum.

XXIV. Any member of the Council absenting himself from three consecutive meetings of the Council, without giving a satisfactory explanation in writing, shall be considered to have vacated his office. No business shall be transacted at any meeting of the Council unless three members at least are present.

Duties of Secretaries.

XXV. The Honorary Secretaries shall perform, or shall cause the Assistant Secretary to perform, the following duties:—

1. Conduct the correspondence of the Society and Council.
2. Attend the General Meetings of the Society and the meetings of the Council, to take minutes of the proceedings of such meetings, and at the commencement of such to read aloud the minutes of the preceding meeting.
3. At the Ordinary Meetings of the members, to announce the presents made to the Society since their last meeting; to read the certificates of candidates for admission to the Society, and such original papers communicated to the Society as are not read by their respective authors, and the letters addressed to it.
4. To make abstracts of the papers read at the Ordinary General Meetings, to be inserted in the Minutes and printed in the Proceedings.
5. To edit the Transactions of the Society, and to superintend the making of an Index for the same.
6. To be responsible for the arrangement and safe custody of the books, maps, plans, specimens, and other property of the Society.

7. To make an entry of all books, maps, plans, pamphlets, &c., in the Library Catalogue, and of all presentations to the Society in the Donation Book.

8. To keep an account of the issue and return of books, &c., borrowed by members of the Society, and to see that the borrower, in every case, signs for the same in the Library Book.

9. To address to every person elected into the Society a printed copy of the Forms Nos. 2 and 3 (in the Appendix), together with a list of the members, a copy of the Rules, and a card of the dates of meeting; and to acknowledge all donations made to the Society, by Form No. 6.

10. To cause due notice to be given of all Meetings of the Society and Council.

11. To be in attendance at 4 p.m. on the afternoon of Wednesday in each week during the session.

12. To keep a list of the attendances of the members of the Council at the Council Meetings and at the ordinary General Meetings, in order that the same may be laid before the Society at the Annual General Meeting held in the month of May.

The Honorary Secretaries shall, by mutual agreement, divide the performance of the duties above enumerated.

The Honorary Secretaries shall, by virtue of their office, be members of all Committees appointed by the Council.

Contributions to the Society.

XXVI. Contributions to the Society, of whatever character, must be sent to one of the Secretaries, to be laid before the Council of Management. It will be the duty of the Council to arrange for promulgation and discussion at an Ordinary Meeting such communications as are suitable for that purpose, as well as to dispose of the whole in the manner best adapted to promote the objects of the Society.

Management of Funds.

XXVII. The funds of the Society shall be lodged at a Bank named by the Council of Management. Claims against the Society, when approved by the Council, shall be paid by the Treasurer.

All cheques shall be countersigned by a member of the Council.

Money Grants.

XXVIII. Grants of money in aid of scientific purposes from the funds of the Society—to Sections or to members—shall expire on the 1st of November in each year. Such grants, if not expended, may be re-voted.

XXIX. Such grants of money to Committees and individual members shall not be used to defray any personal expenses which a member may incur.

Audit of Accounts.

XXX. Two Auditors shall be appointed annually, at an Ordinary Meeting, to audit the Treasurer's Accounts. The accounts as audited to be laid before the Annual Meeting in May.

Property of the Society to be vested in the President, &c.

XXXI. All property whatever belonging to the Society shall be vested in the President, Vice-Presidents, Hon. Treasurer, and Hon. Secretaries for the time being, in trust for the use of the Society; but the Council shall have control over the disbursements of the funds and the management of the property of the Society.

Sections.

XXXII. To allow those members of the Society who devote attention to particular branches of science fuller opportunities and facilities of meeting and working together with fewer formal

restrictions than are necessary at the general Monthly Meetings of the Society,—Sections or Committees may be established in the following branches of science:—

Section A.—Astronomy, Meteorology, Physics, Mathematics, and Mechanics.

Section B.—Chemistry and Mineralogy, and their application to the Arts and Agriculture.

Section C.—Geology and Palæontology.

Section D.—Biology, *i.e.*, Botany and Zoology, including Entomology

Section E.—Microscopical Science.

Section F.—Geography and Ethnology.

Section G.—Literature and the Fine Arts, including Architecture.

Section H.—Medical.

Section I.—Sanitary and Social Science and Statistics.

Section Committees—Card of Meetings.

XXXIII. The first meeting of each Section shall be appointed by the Council. At that meeting the members shall elect their own Chairman, Secretary, and a Committee of four; and arrange the days and hours of their future meetings. A card showing the dates of each meeting for the current year shall be printed for distribution amongst the members of the Society.

Membership of Sections.

XXXIV. Only members of the Society shall have the privilege of joining any of the Sections.

Reports from Sections.

XXXV. There shall be for each Section a Chairman to preside at the meetings, and a Secretary to keep minutes of the proceedings, who shall jointly prepare and forward to the Hon. Secretaries of the Society, on or before the 7th of December in each year, a report of the proceedings of the Section during that year, in order that the same may be transmitted to the Council.

Reports.

XXXVI. It shall be the duty of the President, Vice-Presidents, and Honorary Secretaries to annually examine into and report to the Council upon the state of—

1. The Society's house and effects.
2. The keeping of the official books and correspondence.
3. The library, including maps and drawings.
4. The Society's cabinets and collections.

Cabinets and Collections.

XXXVII. The keepers of the Society's cabinets and collections shall give a list of the contents, and report upon the condition of the same to the Council annually.

Documents.

XXXVIII. The Honorary Secretaries and Honorary Treasurer shall see that all documents relating to the Society's property, the obligations given by members, the policies of insurance, and other securities shall be lodged in the Society's iron chest, the contents of which shall be inspected by the Council once in every year; a list of such contents shall be kept, and such list shall be signed by the President or one of the Vice-Presidents at the annual inspection.

Branch Societies.

XXXIX. The Society shall have power to form Branch Societies in other parts of the Colony.

Library.

XL. The members of the Society shall have access to, and shall be entitled to borrow books from the Library, under such regulations as the Council may think necessary.

Alteration of Rules.

XLI. No alteration of, or addition to, the Rules of the Society shall be made unless carried at two successive General Meetings, at each of which, twenty-five members at least must be present.

THE LIBRARY.

1. During the Session, the Library shall be open for consultation and for the issue and return of books between 4 and 6 p.m. on the afternoon of each Wednesday, and between 7 and 10 p.m. on the evenings of Monday, Wednesday, and Friday, and during the recess (January to end of April) on Wednesdays, from 4 to 6 and 7 to 10 p.m.

2. No book shall be issued without being signed for in the Library Book.

3. Members are not allowed to have more than two volumes at a time from the Library, without special permission from one of the Honorary Secretaries, nor to retain a book for a longer period than fourteen days; but when a book is returned by a member it may be borrowed by him again, provided it has not been bespoken by any other member. Books which have been bespoken shall circulate in rotation, according to priority of application.

4. Scientific Periodicals and Journals will not be lent until the volumes are completed and bound.

5. Members retaining books longer than the time specified shall be subject to a fine of sixpence per week for each volume.

6. The books which have been issued shall be called in by the Secretaries twice a year; and in the event of any book not being returned on those occasions, the member to whom it was issued shall be answerable for it, and shall be required to defray the cost of replacing the same.

Form No. 1.

ROYAL SOCIETY OF NEW SOUTH WALES.

Certificate of a Candidate for Election.

Name

Qualification or occupation

Address

being desirous of admission into the Royal Society of New South Wales, we, the undersigned members of the Society, propose and recommend him as a proper person to become a member thereof.

Dated this day of 18 .

FROM PERSONAL KNOWLEDGE.	FROM GENERAL KNOWLEDGE.

Signature of candidate

Date received 18 .

*** This certificate must be signed by at least three members, to two of whom candidate must be personally known.

Form No. 2.

ROYAL SOCIETY OF NEW SOUTH WALES.

The Society's House,

Sir, Sydney, 18 .

I have the honour to inform you that you have this day been elected a member of the Royal Society of New South Wales, and I beg to forward to you a copy of the Rules of the Society, a printed copy of an obligation, a list of members, and a card announcing the dates of meeting during the present session.

According to the Regulations of the Society (*vide* Rule No. 9), you are required to pay your admission fee of two guineas, and annual subscription of two guineas for the current year, before admission. You are also requested to sign and return the enclosed form of obligation at your earliest convenience.

I have, &c.,

To Hon. Secretary.

Form No. 3.

ROYAL SOCIETY OF NEW SOUTH WALES.

I, the undersigned, do hereby engage that I will endeavour to promote the interests and welfare of the Royal Society of New South Wales, and to observe its Rules and By-laws, as long as I shall remain a member thereof.

Signed,

Address

Date

Form No. 4.

ROYAL SOCIETY OF NEW SOUTH WALES.

The Society's House,

Sir, Sydney, 18 .

I have the honour to inform you that your annual subscription of for the current year became due to the Royal Society of New South Wales on the 1st of May last.

It is requested that payment may be made by cheque or Post Office order drawn in favour of the Hon. Treasurer.

I have, &c.,

To Hon. Treasurer.

Form No. 5.

ROYAL SOCIETY OF NEW SOUTH WALES.

The Society's House,

Sir, Sydney, 18 .

I am desired by the Royal Society of New South Wales to forward to you a copy of its Journal for the year 18 , as a donation to the library of your Society.

I am further requested to mention that the Society will be thankful to receive such of the very valuable publications issued by your Society as it may feel disposed to send.

I have the honour to be,

Sir,

Your most obedient servant,

Hon. Secretary.

Form No. 6.

ROYAL SOCIETY OF NEW SOUTH WALES.

The Society's House,

Sir, Sydney, 18 .

On behalf of the Royal Society of New South Wales, I beg to acknowledge the receipt of and I am directed to convey to you the best thanks of the Society for your most valuable donation.

I have the honour to be,

Sir,

Your most obedient servant,

Hon. Secretary.

Form No. 7.

Balloting List for the Election of the Officers and Council.

ROYAL SOCIETY OF NEW SOUTH WALES.

Date......................

BALLOTING LIST for the election of the Officers and Council.

Present Council.	Names proposed as Members of the new Council.	
	President.	
	Vice-Presidents.	
	Hon. Treasurer.	
	Hon. Secretaries.	
	Members of Council.	

If you wish to substitute any other name in place of that proposed, erase the printed name in the second column, and write opposite to it, in the third, that which you wish to substitute.

LIST OF THE MEMBERS

OF THE

Royal Society of New South Wales.

P Members who have contributed papers which have been published in the Society's Transactions or Journal; papers published in the Transactions of the Philosophical Society are also included. The numerals indicate the number of such contributions.
† Members of the Council.
‡ Life Members.

Elected.		
1877		Abbott, Joseph Palmer, 6 Wentworth Court, Elizabeth-street.
1877	P 1	Abbott, Thomas Kingsmill, P.M., Gunnedah.
1877	P 2	Abbott, W. E., Glengarry, Wingen.
1877		Adams, Francis, A.J.S. Bank, Sydney.
1864		Adams, P. F., Surveyor General, Kirribilli Point, St. Leonards.
1878		Alexander, George M., 48, Margaret-street.
1874		Alger, John, Macquarie-street.
1870		Allen, The Hon. Sir George Wigram, M.P., Speaker of the Legislative Assembly, 124, Elizabeth-street North.
1868		Allerding, F., Hunter-street.
1873		Allerding, H. R., Hunter-street.
1856		Allwood, Rev. Canon, B.A. *Cantab.*, Vice-Chancellor, University of Sydney, Woollahra.
1876		Alston, John Wilson, M.B. *Edin.*, Mast. Surg. *Edin.*, 455, Pitt-street.
1881		Amos, Robert, 213, Macquarie-street.
1877		Anderson, H. C. L., M.A., Sydney Grammar School.
1878		Archer, W. H., F.I.A., Australian Club.
1876		Armstrong, W. D., Surveyor General's Office.
1879		Arnheim, E. H., Royal Mint, Sydney.
1876		Atchison, Cunningham Archibald, C.E., North Shore.
1873		Atherton, Ebenezer, M.R.C.S. *Eng.*, O'Connell-street.
1873		Austen, Henry, Hunter-street.
1876		Backhouse, Benjamin, "Ithaca," Elizabeth Bay.
1878		Backhouse, Alfred P., M.A., "Ithaca," Elizabeth Bay.
1877		Baker, E. A., Sydney.
1878		Balfour, James, Union Club.
1881		Barff, H. E., M.A., Sydney University.
1876	P 4	Barkas, Wm. James, Lic. R. Col. Phys. *Lond.*, M.R.C.S. *Eng.*, Warialda.

Elected.		
1878		Barker, Francis Lindsay, 130, Pitt-street.
1879		Barraclough, William, 4, Yurong-street.
1875		Bartels, W. C. W., Union Club.
1876		Bassett, W. F., M.R.C.S., *Eng.*, Bathurst.
1878		Bayley, George W. A., Railway Department, Phillip-street.
1880		Beattie, Josh. A., Lic. K. & Q. Coll. Phys., *Irel.*, Lic. R. Coll. Sur., *Irel.*, Quarantine Station.
1875		Bedford, W. J. G., M.R.C.S. *Eng.*, Staff Surgeon, Victoria Barracks.
1868		Beilby, E. T., Pitt-street.
1875		Belgrave, Thomas B., M.D. *Edin.*, M.R.C.S. *Eng.*, 153 Elizabeth-street.
1877		Belfield, Algernon H., Eversleigh, Armidale.
1875		Belisario, John, M.D., Lyons' Terrace.
1876	P 2	Benbow, Clement A., 24, College-street.
1869		Bensusan, S. L., Exchange, Pitt-street.
1877		Bennett, George F., C.M.Z.S., Toowoomba, Queensland.
1878		Berney, Augustus, H. M. Customs, Sydney.
1878		Bestic, Edwin Henry, L.R.C.S., *Irel.*, L.R.C.P., *Edin.*, Arthursleigh-terrace.
1878		Black, Reginald James, Bank of New South Wales, Sydney.
1878		Black, Morrice A., F.I.A., Actuary, Mutual Provident Society.
1880		Blackmann, C. H. E., 267, George-street.
1877		Bladen, Thomas, 31, Darlinghurst Road.
1872		Bolding, H. J., Commissioner of Crown Lands, Scone.
1879		‡Bond, Albert, Bell's Chambers, Pitt-street.
1874		Bowen, George M. C., Keston, Kirribilli Point, North Shore.
1876		Brady, Andrew John, Lic. K. & Q. Coll. Phys. *Irel.*, Lic. R. Coll. Sur. *Irel.*, Lyons' Terrace.
1871	P 1	Brazier, John, C.M.Z.S., Corr. M.R.S., Tas., 82, Windmill-street.
1868		Brereton, John Le Gay, M.D. *St. Andrew's*, L.R.C.S. *Edin.*, Domain Terrace.
1879		Brindley, Thomas, Nepean Cottage, Bourke-street, Redfern.
1876		Brodribb, W. A., The Hon. M.L..C, F.R.G.S., Double Bay.
1878		‡Brooks, Joseph, F.R.G.S., Hope Bank, Nelson-st., Woollahra.
1876		Brown, Henry Joseph, Newcastle.
1880		Brown, John Studd, Dubbo.
1876		Brown, Thomas, Eskbank, Bowenfels, and Australian Club.
1877		Bundock, W. C., Wyangarie, Casino.
1876		Burn, James Henry, 93, Palmer-street, Woolloomooloo.
1875		Burton, Edmund, Land Titles Office, Elizabeth-street North.
1877		Burnell, Arthur, Survey Office.
1878		Burnett, Robt. H., C.E., Railway Department.
1875		Busby, The Hon. William, M.L.C., "Redleaf," South Head Road, Woollahra.
1880		Bush, Thomas James, Gas Works, Sydney.
1878		Butterfield, George, Survey Office.
1876		Cadell, Alfred, Vegetable Creek, New England.
1876		Cadell, Thomas, Wotonga, East St. Leonards.
1880		Caird, George C., Lillingstone, Ocean-street, Woollahra.
1876		Campbell, Allan, L.R.C.P., *Glasgow*, Yass.

Elected.		
1876		Campbell, The Hon. Alexander, M.L.C., Woollahra.
1868		Campbell, The Hon. Charles, M.L.C., Clunes, South Kingston.
1879		Cameron, John, surveyor, Barringun, *viâ* Bourke.
1879		Campbell, Revd. Joseph, B.A., "Edgarville," Botany-street, Surry Hills.
1870		Cane, Alfred, 110, Victoria-street.
1876		Cape, Alfred J., "Torfrida," Elizabeth Bay.
1876		Chandler, Alfred, 185, Pitt-street.
1879		Chard, J. S., District Surveyor, Armidale.
1878		Chatfield, William, Parkhouse, Parramatta.
1878		Chisholm, Edwin, M.D., M.R.C.S., L.S.A., &c., Ashfield.
1877		Clarke, William, care of John Wilson & Co., York-street.
1874		Clay, William French, M.A., *Cantab.*, M.D. *Syd.*, M.R.C.S. *Eng.*, Fellow of St. Paul's Col., North Shore.
1876		Clune, Michael Joseph, M.A., Lic. K. & Q. Coll. Phys. *Irel.*, Lic. R. Coll. Sur. *Irel.*, 12, College-street.
1876		Codrington, John Fredk., M.R.C.S., E.; Lic. R.C. Phys., L.; Lic. R.C. Phys., *Edin.*, Orange.
1878		Collie, Revd. Robert, The Manse, Wellington-street, Newtown.
1878		Colquhoun, George, 3, Mona-terrace, Rushcutters' Bay.
1880		Colyer, Henry Cox, M.A., Clinton, Liverpool-street, Darlinghurst
1876		Colyer, John Ussher Cox, A.S.N. Company, Sydney.
1856		Comrie, James, Northfield, Kurrajong Heights.
1876		Conder, Wm., Survey Office, Sydney.
1878		Cottee, Wm. Alfred, Spring-street.
1880		Cox, The Hon. George Henry, M.L.C., Mudgee, and Union Club, Sydney.
1859	P 1	Cox, James, M.D. *Edin.* C.M.Z.S., F.L.S., Hunter-street.
1865	P 2	Cracknell, E. C., Superintendent of Telegraphs, Telegraph Office, George-street.
1869		Creed, J. Mildred, M.R.C.S. *Eng.*, Scone.
1870		Croudace, Thomas, Lambton.
1881		Crummer, Henry, Rialto Terrace, Darlinghurst.
1877		Cunningham, Andrew, Lanyon, Queanbeyan.
1873		Daintrey, Edwin, "Æolia," Randwick.
1876		Dalgarno, John V., Telegraph Office, George-street.
1876		Dansey, George Frederick, M.R.C.S. *London*, Cleveland-street, Redfern.
1875		Dangar, Frederick H., care of Dangar, Gedye, & Co., Macquarie Place.
1876		Darley, Cecil West, Newcastle.
1877		Darley, F. M., M.A., Union Club, Sydney.
1879		Davenport, Samuel, Adelaide, South Australia.
1878		Dean, Alexander, J.P., Elizabeth-street.
1877		Deck, John Field, M.D., 251, Macquarie-street.
1856		Deffell, George H., Bayfield, Woolwich Road, Hunter's Hill.
1881		Delarue, Leopold H., 378, George-street.
1878		De Lissa, S., 3, Barrack-street.
1875		De Salis, The Hon. Leopold Fane, M.L.C., Cuppercumbalong, Lanyon.
1875		De Salis, L. W., junr., Strathmore, Bowen, Queensland.

lected.

1876 | | Dight, Arthur, Richmond.
1875 | P 8 | †Dixon, W. A., F.C.S., Fellow and Member Inst. of Chemistry of Gt. Britain and Irel., Lecturer on Chemistry, School of Arts; Chemical Laboratory, School of Arts, Sydney.
1880 Dixson, Craig, M.B., C.M., *Edin.*, M.R.C.S., *Eng.*, 2, Clarendon Terrace, Elizabeth-street.
1880 Dixson, Thomas, M.B., C.M., *Edin.*, 2 Kenilworth Lodge, Wallis-street, Woollahra.
1876 Docker, Ernest B., M.A. *Sydn.*, Carhullen, Parramatta.
1879 Docker, Wilfred L. Craigstone, William-street South.
1876 Douglas, James, L.R.C.S. *Edin.*, Hope Terrace, Glebe Road.
1879 Dowling, Neville, Wallis-street, Woollahra.
1876 Drake, William Hedley, Fellow of the Inst. of Bankers, Lond., Colonial Bank of New Zealand, Nelson, N.Z.
1873 Du Faur, Eccleston, F.R.G.S., Lands Office.

1876 Eales, John, Duckenfield Park, Morpeth.
1876 Egan, Myles, M.R.C.S. *Eng.*, 2, Hyde Park Terrace, Liverpool-street.
1874 Eichler, Charles F., M.D. *Heidelberg*, M.R.C.S. *Eng.*, Bridge-street.
1876 Eldred, W. H., 62, Margaret-street.
1881 Elliott, F. W., Elizabeth Bay.
1878 Ellis, Thomas Augustus, C.E., City Engineer, Newcastle.
1876 Evans, George, Como, Darling Point.
1876 Evans, Owen Spencer, M.R.C.S. *Eng.*, Darling-street, Balmain.
1881 Evans, Dr. Thomas, Lady Young Terrace, Bridge-street.
1881 Ewan, Dr. John Frazer, Carlton Terrace, Wynyard Square.

1877 Fairfax, Edward R., 177, Macquarie-street.
1868 Fairfax, James R., *Herald* Office, Hunter-street.
1880 Ferguson, James W., 70, Darlinghurst Road.
1881 Fiaschi, Thos., M.D., M. Ch., Univ. Pisa, Windsor.
1880 Finlayson, David, Manager, Union Bank.
1876 Firth, Rev. Frank, Wesleyan Parsonage, St. Leonards.
1874 Fischer, Carl F., M.D., M.R.C.S., *Eng.*; L.R.C.P., *Lond.*; F.G.S.; F.L.S.; F.R.M.S.; Member Imp. Botanical and Zoological Society, Vienna; Corr. Member Imp. Geographical Society, Vienna; 251, Macquarie-street.
1876 Fitzgerald, R. D., F.L.S., Surveyor General's Office.
1856 Flavelle, John, George-street.
1880 Forbes, Alexr. Leith, M.A., Dept. of Public Instruction.
1863 Fortescue, G., M.B. *Lond.*, F.R.C.S., F.L.S., Lyons' Terrace.
1879 Foreman, Joseph, M.R.C.S. *Lond.*, L.R.C.P. *Edin.*, Lithgow.
1881 Foster, The Hon. W. J., M.L.A., Temple Court, King-street.
1878 Fraser, Robert, 12, Barrack-street.
1875 Frazer, Hon. John, M.L.C., York-street.
1878 Fuller, Francis John, Harbours and Rivers Office, Fitzroy Dock.
1881 Furber, T. F., Surveyor General's Office.

Elected.		
1879		Gabriel, C. Louis, care of Dr. J. J. Hill, Lambton.
1880		Gardiner, Rev. Andrew, M.A., Rensdale, Pyrmont Bridge Road.
1877		Garnsey, Rev. C. F., Christ Church Parsonage, Sydney.
1868	P 1	Garran, Andrew, LL.D., *Sydney Morning Herald* Office, Hunter-street.
1877		Garvan, J. P., East St. Leonards.
1878		Gedye, Charles Townsend, "Eastbourne," Darling Point.
1878		George, Hugh, *Sydney Morning Herald* Office.
1876		George, W. R, 360 George-street.
1879		Gerard, Francis, Occupation of Lands Office.
1878		Giblin, Vincent W., Australian Joint Stock Bank, Sydney.
1876		Gilchrist, W. O., Greenknowes, Potts's Point.
1875		Gilliat, Henry Alfred, Australian Club.
1876	P 2	Gipps, F. B., C.E., 134, Pitt-street.
1878		Goddard, William C., The Exchange, New Pitt-street.
1881		Goergs, Karl W., Riviere College, Woollahra.
1859		Goodlet, John H., George-street.
1876		Goode, George, M.A., M.D., M. Ch., Trin. Coll., *Dub.*, Enfield House, Camden.
1876		Graham, Hon. Wm., M.L.C., Strathearn House, Waverley.
1873		Greaves, W. A. B., Braylesford, Bondi.
1881		Griffin, T. H. F., Richmond.
1878		Griffiths, Frederick C., Macquarie-street.
1877		Griffiths, G. Neville, The Domain, Sydney.
1877		Gurney, T. T., M.A. *Cantab.*, late Fellow of St. John's College, Cambridge, Professor of Mathematics and Natural Philosophy, University of Sydney.
1880		Haege, Hermann, 127, Pitt-street.
1864		Hale, Thomas, Gresham-street.
1878		Hall, Richard T., care of W. H. Quodling, Esq., Public Works Department.
1880		Halligan, Gerald H., C.E., Marrickville.
1874		Hardy, J., Hunter-street.
1881		Harcus, Lorimer E., *Sydney Morning Herald* Office
1877		Hargrave, Lawrence, 94, Upper William-street.
1881		Harris, John, Ultimo.
1877		‡Harrison, L. M., Macquarie Place.
1878	P 2	Hart, Ludovico, Cheltenham, Victoria.
1878		Haviland, E. Cyril, 15 Bridge-street.
1877	P 1	Hawkins, H. S., M.A., Balmain.
1874		Hay, The Hon. Sir John, K.C.M.G., M.L.C., A.M. *Aberdeen*. President of the Legislative Council, Rose Bay, Woollahra.
1876		Heaton, J. H., *Town and Country* Office, Pitt-street.
1881		Helms, Albert, Ph. D., Sydney University.
1875		Helsham, Douglass, Heaton, Homebush.
1877		Henry, James, 754, George-street.
1878		Herborn, E. W. L., care of Mr. Burnell, Clapton, Forbes-street.

Elected.		
1878		Herborn, Eugene, care of Mr. Burnell, Clapton, Forbes-street.
1880		Hern, Charles E., "Ellora," Queen-street, Woollahra.
1876		Heron, Henry, solicitor, 49, Hunter-street.
1878		Hewett, Thomas Edward, The Observatory, Sydney.
1879		Higgins, R. G., Clifford, Potts's Point.
1879		Hills, Robert, Elizabeth Bay.
1880		Hill, Jno. James, J.P., L.R.C.P.E., L.F.P., and S.G.L.M., Lampton, Newcastle.
1879		Hitchins, Edwd. Lytton, Florence, Victoria-street, Darlinghurst.
1877		Hindson, Lawrence, Exchange Buildings, Pitt-street.
1876	P 2	†Hirst, Geo. D., 379, George-street.
1878		Hodgson, Rev. E. G., M.A. *Oxon.*, S.C.L., Vice-Warden of St. Paul's College, University.
1880		Hodgson, Wilfred, M.D., 67, Regent-street.
1868		Holt, The Hon. Thomas, M.L.C., Sutherland House, George's River.
1876		Holroyd, Arther Todd, M.B. *Cantab.*, M.D. *Edin.*, F.L.S., F.Z.S., F.R.G.S., Master-in-Equity, Sherwood Scrubs, Parramatta.
1870		Horton, Rev. Thomas, Ina Terrace, Woollahra.
1879		Houison, Andrew, B.A., M.B.C.M., 128, Phillip-street.
1877		Hume, J. K., Cooma Cottage, Yass.
1878		†Hunt, Robert, F.G.S., Associate of the Royal School of Mines, London, Deputy Master of the Royal Mint, Sydney.
1879		Inglis, James, 7 Bridge-street Chambers.
1877		Innes, Sir J. George L., Knt., Darlinghurst.
1880		Iredale, Lancelot, A.F., Goolhi, Gunnedah.
1878		Jackson, Arthur Levett, Government Printing Office.
1876		Jackson, Henry Willan, M.R.C.S. *Eng.*, Lic. R. C. Phys., *Edin.*, 146, Phillip-street.
1880		Jackson Robert, 89, Pitt-street North.
1879		Jarvie, Rev. A. Milne, Univ. Council, *Edin.*, 13, Lower Fort-street.
1879		Jefferis, Rev. James, LL.B., "The Retreat," Newtown.
1876		Jenkins, Richard Lewis, M.R.C.S., Nepean Towers, Douglass Park.
1879		Johnson, James W., "Brooksby," Double Bay.
1876		Jones, James Aberdeen, Lic. R.C. Phys. *Edin.*, Booth-street, Balmain.
1876		Jones, Richard Theophilus, M.D. *Sydn.*, L.R.C.P. *Edin.*, Ashfield.
1867		Jones, P. Sydney, M.D. *Lond.*, F.R.C.S. *Eng.*, College-street.
1877		Jones, Edward Lloyd, 345, George-street, Sydney.
1874		Jones, James, Bathurst-street.
1877		Jones, Griffith Evan Russell, B.A., *Syd.*, 382, Crown-street, Surry Hills.

Elected.		
1879		Jones, John Trevor, 356, Liverpool-street.
1863		Josephson, Joshua Frey, F.G.S., District Court Judge, Enmore Road, Newtown.
1876	P 1	Josephson, J. P., Assoc. Mem. Inst. C.E., 235, Macquarie-street North.
1878		Joubert, Numa, Hunter's Hill.
1873		Keele, Thos. Wm., Harbours and Rivers Department, Phillip-street.
1877		Keep, John, Broughton, Leichhardt.
1879		Kemmis, Rev. Thomas, St. Mark's Parsonage, Darling Point.
1873		Kennedy, Hugh, B.A. *Oxon.* Registrar of the Sydney University.
1874		King, Philip G., William-street, Double Bay.
1877		Kinloch, John, M.A., 21 Wentworth Court, Elizabeth-street.
1878		Knaggs, Saml. J., M.D., Newcastle.
1881		Knibbs, G. H., Mem. Inst. of Surveyors, Surveyor General's Office.
1874		Knox, George, M.A., *Cantab.*, King-street.
1875		Knox, Edward, The Hon., M.L.C., O'Connell-street.
1877		Knox, Edward W., "Fiona," Double Bay.
1877		Kopsch, G., Telegraph Department.
1878		Kretschmann, Joseph; care of Mr. Moss, Hunter-street.
1878		Kyngdon, F. B., 221, Darlinghurst Road.
1878		Kyngdon, Fred. H., M.D. *Aberdeen;* L.S.A., *L.;* M.R.C.S., *E.;* C.M., *Aberdeen*, North Shore.
1876		Langley, W. E., *Herald* Office, Sydney.
1874	P 1	Latta, G. J., Hawthorne, Crystal-street, Petersham.
1876		Laure, Louis Thos., M.D. Surg. Univ. *Paris*, 138, Castlereagh-street.
1880		Leask, John L, M.B.C.M. *Edin.*, "Terra Bella," Pyrmont Bridge Road.
1859	P 5	†Leibius, Adolph, Ph.D., Heidelberg, M.A., F.C.S.; Fel. Inst. Chemistry of Gt. Brit. and Irl.; Senior Assayer to the Sydney Branch of the Royal Mint, *Hon. Secretary.*
1874		Lenehan, Henry Alfred, Sydney Observatory.
1872	P 21	†Liversidge, Archibald, Assoc. Roy. Sch. Mines, *Lond.;* F.C.S.; Fel. Inst. Chemistry of Gt. Brit. and Irl.; F.G.S.; F.L.S.; F.R.G.S.; Mem. Phy. Soc. London; Mem. Mineralogical Soc. Gt. Brit. and Irel.; Cor. Mem. Roy. Soc. Tas.; Cor. Mem. Senckenberg Institute, Frankfurt; Cor. Mem. Soc. d'Acclimat. Mauritius; Hon. Fel. Roy. Hist. Soc. Lond.; Mem. Min. Soc. of France; Professor of Chemistry and Mineralogy in the University of Sydney, *Hon. Secretary.* The University, Glebe.

Elected		
1875		Living, John, Marsaloo, North Shore.
1874		Lloyd, George Alfred, F.R.G.S., "Scottforth," Elizabeth Bay.
1881		Lloyd, Lancelot T., Kellett-street.
1879		Loftus, His Excellency The Right Hon. Lord Augustus, G.C.B., &c., &c., &c., *Hon. President.*
1876		Lord, The Hon. Francis, M.L.C., North Shore.
1877		Lord, George Lee, Kirketon, Darlinghurst.
1878		Low, Hamilton, H.M. Customs.
1880		Low, Andrew S., Merrylands, Granville.
1881		Lowe, Edwin, Wilgar Downs Station, *via* Dubbo.
1876		M'Culloch, A. H., jun., 121, Pitt-street.
1874		M'Cutcheon, John Warner, Assayer to the Sydney Branch of the Royal Mint.
1878		MacDonald, Ebenezer, Oriental Bank, Sydney.
1859		MacDonnell, William, 312, George-street.
1868		MacDonnell, William J., F.R.A.S., Bank of New South Wales, George-street.
1877		MacDonnell, Samuel, 312, George-street, Sydney.
1876		M'Kay, Dr., Church Hill.
1880		M'Kinney, Hugh G., Assoc. Mem. Inst. C.E., "Seaton," Point Piper Road, Paddington.
1876		MacLaurin, Henry Norman, M.A., M.D. Univ. *Edin.*, Lic. R. Coll. Sur. *Edin.*, No. 155, Macquarie-street.
1878	P 1	‡MacPherson, Rev. Peter, M.A., 187, Albion-street, Sydney.
1872		Mackenzie, John, F.G.S., Examiner of Coal Fields, Newcastle.
1874		Mackenzie, W. F., M.R.C.S., *Eng.*, Lyons' Terrace.
1876		Mackenzie, Rev. P. F., "Friendville," Paddington.
1880		Mackenzie, R. M., The Exchange Corner.
1876		Mackellar, Chas. Kinnard, M.B., C.M., *Glas.*, Macquarie-street.
1881		Maclean, L. H. J., M.R.C.S., 26, Alberto Terrace, Darlinghurst.
1878		Maitland, Duncan Mearns, junior, "Afreba," Stanmore Road.
1873		Makin, G. E., Berrima.
1880		Manfred, Edmund C., Montague-street, Goulburn.
1877		Mann, John, Neutral Bay.
1881		Mann, Herbert W., care of Liverpool & London & Globe Insurance Co., Pitt-street.
1881		Manning, Sir W. M., Walleroy, Edgecliffe Road, Woollahra.
1873	P 5	Manning, James, Milson's Point, North Shore.
1876		†Manning, Frederick Norton, M.D. Univ. *St. And.*, M.R.C.S. *Eng.*, Lic. Soc. Apoth. *Lond.*, Gladesville.
1869		Mansfield, G.A., Pitt-street.
1878		Markey, James, L.R.C.S., *Irel.*, L.R.C. Phys., *Edin.*, Regent-street.
1878		Marklove, Robert J., Macquarie Place.
1880		Marano, G. V., M.D. Univ. *Naples*, Clarendon Terrace, Elizabeth-street.
1872		Marsden, The Right Rev. Dr., Bishop of Bathurst, Bathurst.
1876		Marsh, J. M., Edgecliff Road, Woollahra.
1876		Marshall, George, M.D. Univ. *Glas.*, Lic. R. Coll. S. *Edin.*, Lyons' Terrace.
1876		Martin, Rev. George, Parramatta.
1879		Masters, Edward, Lurlei, Marrickville.

Elected.		
1875		Mathews, R. H., Singleton.
1879		Matthews, Robert, Tumut-street, Adelong.
1879		Meslée, E. Marin de la, Surveyor General's Office.
1868		Metcalfe, Michael, 9, Bridge-street.
1873		Milford, F., M.D. *Heidelberg*, M.R.C.S. *Eng.*, 3, Clarendon Terrace, Hyde Park.
1876		Millard, Rev. Henry Shaw, Newcastle Grammar School.
1875		Moir, James, Burwood.
1875		Montefiore, E. L., Macleay-street.
1878		Montefiore, Octavius L., Belgian Consul, Gresham-street.
1850	P 3	†Moore, Charles, F.L.S., Director of the Botanic Gardens, Botanic Gardens.
1879		Moore, Fred. H., Exchange Buildings.
1850		Morehead, R. A. A., 30, O'Connell-street.
1876		Morgan, Allan Bradley, M.R.C.S. *Eng.*, Lic. Mid. Lic. R. Coll. Phys. *Edin.*, Ashenhurst, Burwood.
1876		Morgan, T. C., L.R.C.S. *Edin.*, M.K. & Q. Coll. Phys. *Ireland*, 55, Castlereagh-street.
1865	P 1	Morrell, G. A., C.E., Pitt-street.
1877		Morris, William, F.F.P.S. *Glas.* & F.R.M.S.L., 5, Carlton Terrace, Wynyard Square, Sydney.
1880		Moses, David, "Aurovida," Forest Lodge.
1879		Mountain, Adrian C., City Surveyor, Town Hall.
1877		‡Mullens, Josiah, F.R.G.S., 34, Hunter-street.
1879		Mullins, John, F.L., M.A., 211, Macquarie-street.
1865		Murnin, M. E., Eisenfels, Nattai.
1876		Murray, W. G., 93, Pitt-street.
1876		Myles, Chas. Henry, Wymela, Burwood.
1873		Neill, William, City Bank, Pitt-street.
1879		Neill, W. J. Walter, London Hospital, Whitechapel, London, E.
1874		Neill, A. L. P., City Bank, Pitt-street.
1879		Newman, W., care of Messrs. David Jones & Co., George-street.
1878		Newton, John, care of C. Newton, Bros. & Co., Pitt-street.
1881		Newton, Dr. J. L., Mudgee.
1873		Norton, James, Hon., M.L.C., solicitor, Spring-street.
1875		Nott, Thomas, M.D. *Aberdeen*, M.R.C.S. *Eng.*, Ocean-street, Woollahra.
1878		Nowlan, John, Union Club and West Maitland.

Elected.	
1880	Oakes, Arthur W., M.B., C.M., L.R.C.P., L.R.C.S., *Edin.*, "Chiswick," Ocean-street, Woollahra.
1879	O'Connor, Dr. Maurice, 223, Victoria-street.
1881	O'Connor, Richd. Edwd., M.A., Wentworth Court, Elizabeth-street.
1878	Ogilvy, James L.,Oriental Bank, Sydney.
1877	Olley, Rev. Jacob, Manly.
1875	O'Reilly, W. W. J., M.D., M.C., Q. Univ. *Irel.*, M.R.C.S., *Eng.*, Liverpool-street.
1880	Paling, W. H., "Wonden," Cambridge-street, Petersham.
1875	Palmer, J. H., Legislative Assembly.
1880	Palmer, Joseph, 133, Pitt-street.
1876	Parrott, Thomas S., C.E., Ashfield.
1878	Paterson, Hugh, junr., 229, Macquarie-street.
1877	Paterson, James A., Union Bank, Pitt-street.
1878	Paterson, Alexander, M.D., M.A., "Hillcrest," Stanmore Road.
1877	Pedley, Perceval R., 48, Wynyard Square.
1877	Perkins, Henry A., Pembrook, Johnson-street, Balmain.
1881	Philip, Alexr., L.K. and Q.C.P., *Irel.*, L.R.C.S., *Irel.*, Lylehurst House, Devonshire-street.
1856	Phillip, H., Pacific Insurance Company, 85, Pitt-street.
1876	Pickburn, Thomas, M.D. *Aberdeen*, Ch. M., M.R.C.S. *Eng.*, 40, College-street.
1879	Pittman, Edwd. Fisher, L.S., Department of Mines.
1881	Poate, Frederic, Summer Hill.
1879	Pockley, Thos. F. G., Commercial Bank, Singleton.
1878	Poolman, F., Colonial Sugar Refining Co., O'Connell-street.
1881	Poolman, Fredk., jun., "Esher," Nelson-street, Woollahra.
1878	Potts, J. H., Want-street, Burwood.
1862	Prince, Henry, George-street.
1876	Quaife, Fredk. Harrison, M.D., Mast. Surg. Univ. *Glas.*, Hughenden, Queen-street, Woollahra.
1876	Quirk, Rev. Dr. J. A., O.S.B., LL.D., *Syd.*, St. Joseph's, Newtown.
1878	Quirk, Rev. D. Placid, M.A. *Syd.*, Post Office, Cook's River.
1876	Quodling, W. H., "Conranga," Burwood.

Elected.		
1865	P 1	‡Ramsay, Edward, F.L.S., Curator of the Australian Museum, College-street.
1876		‡Ratte, F., G.P.O., Sydney.
1874		Read, Reginald Bligh, M.R.C.S., *Eng.*, Coogee.
1868		Reading, E., Mem. Odont. Soc. *Lond.*, Castlereagh-street.
1876		Reece, J. D., Surveyor General's Office.
1881		Reid, William, Australian Joint Stock Bank, Sydney.
1881	P 1	Rennie, Edwd. H., M.A., B.Sc., London.
1870		Renwick, Arthur, The Hon., M.D. *Edin.*, B.A. *Sydn.*, F.R.C.S. *E.*, M.L.A., 295, Elizabeth-street.
1880		Riddell, C. E., Union Club.
1856		Roberts, J., George-street.
1868	P 3	Roberts, Alfred, M.R.C.S. *Eng.*, Hon. Mem. Zool. and Bot. Soc. Vienna, Bridge-street.
1881		Roberts, C. J., "Chatsworth," Potts's Point.
1878		Roberts, William, Australian Club.
1871		Robertson, Thomas, solicitor, 91, Pitt-street.
1856	P 6	†Rolleston, Christopher, C.M.G., Auditor General, Castlereagh-street, *Vice-President.*
1880		Rome, Robert, Union Club.
1878		Rose, W., Union Club.
1881		Roser, Carl, M.D., 52, College-street.
1865		Ross, J. Grafton, O'Connell-street.
1881	P 1	Roth, Henry Ling, F.S.S., F.M.S., Foulden Estate, Mackay, Queensland.
1876		Rowling, Dr., Chas., Mudgee.
1864	P 24	†Russell, Henry C., B.A. *Syd.*, F.R.A.S., F.M.S., Hon. Mem. S. Aust. Inst., Government Astronomer, Sydney Observatory, *President.*
1875		Sahl, Charles L., German Consul, Consulate of the German Empire, Wynyard Square.
1876		Saliniere, Rev. E. M., Glebe.
1876		Samuel, The Hon. Saul, C.M.G., M.L.C., Gresham-street.
1880		Sandy, James, "Rothgael," Croydon Road, Ashfield.
1876		Schuette, Rudolf, M.D., Univ. *Göttingen*, Lic. Soc. Apoth. *Lond.*, 10, College-street.
1856	P 1	‡Scott, Rev. William, M.A. *Cantab.*, Hon. Mem. Roy. Soc. Vic., The Parsonage, Bungendore.
1880		Scrivener, Charles Robert, Berlin Cottage, Fotheringham-street, Stanmore.
1876		Sedgwick, Wm. Gillett, M.R.C.S., *Eng.*, Newtown.
1877		Selfe, Norman, C.E., M.I.C.E., Rockleigh, Balmain.
1876		Sharp, James Burleigh, J.P., Clifton Wood, Yass.
1876		Sharp, Henry, Green Hills, Adelong.
1878	P 1	Sharp, Revd. W. Hey, M.A. *Oxon.*, Warden of St. Paul's College, University.
1879		Shepard, A.D., Adelong.
1881		Shepherd, T. W., "Norwood," Milson's Point, St. Leonards East.
1875		Sheppard, Rev. G., B.A., Berrima.
1878		Skinner, J. H., B.A. *Oxon.*, Grammar School, Sydney.
1875		Slade, G. P., solicitor, Bridge-street.

Elected.		
1877		Slattery, Thomas, Premier Terrace, 169, William-street, Woolloomooloo.
1877		Sloper, Fredk. Evans, 360, Liverpool-street.
1881		Smedley, John, "Arlula," 139, Queen-street, Woollahra.
1852	P 6	†Smith, John, The Hon., C.M.G., M.D., LL.D., *Aberdeen*, M.L.C., F.C.S., Hon. Mem. Roy. Soc. Vic., Professor of Physics in the University of Sydney, 193, Macquarie-street, *President*.
1878	P 1	Smith, Marshall, Glanville-street, Glanville, South Australia.
1875		Smith, Robt., M.A. *Syd.*, solicitor, Spring-street.
1874		‡Smith, John M'Garvie, Hunter-street.
1876		Smith, R. S., Surveyor General's Office.
1878		Smith, E. E., Fevereaux, Roslyn-street, Upper William-street, North.
1881		Smyth, F. L. S., M.A., F.R.G.S., Wentworth Court, Elizabeth-street.
1879		Spry, James Monsell, Union Club.
1881		Starkey, John Thos., Castlereagh-street.
1872	P 1	Stephen, George Milner, B.A., F.G.S., Mem. Geol. Soc. of Germany; Cor. Mem. Nat. Hist. Soc., Dresden; F.R.G.S. of Cornwall; "Almaville," Pyrmont Bridge Road.
1879		Stephen, Septimus, South Kingston.
1879		Stephen, Alfred F. H., Pyrmont Bridge Road.
1857		Stephens, William John, M.A. *Oxon.*, 233, Darlinghurst Road.
1876		Stopps, Arthur J., Surveyor General's Office.
1878		Street, John Rendell, Birtley, Elizabeth Bay Road.
1876		Strong, Wm. Edmund, M.D., *Aberdeen*, M.R.C.S., *Eng.*, Liverpool.
1874		Stuart, Alexander, M.L.A., Sydney.
1876		Stuart, Clarendon, Upper William Street South.
1876		Suttor, Wm. Henry, M.L.A., Cangoura, Bathurst.
1879		Tarrant, Harman, M.R.C.S., Elizabeth-street.
1874		Taylor, Chas., M.D. *Syd.*, M.R.C.S., *Eng.*, Parramatta.
1879		Taylor, Chas. Lamb, M.R.C.S., 14, College-street.
1876		Taylor, William George, F.R.C.S., *Lond.*, 219, Pitt-street.
1862	P 10	Tebbutt, John, F.R.A.S., Observatory, Windsor.
1879		Thomson, Dugald, 20, Charlotte Place.
1870	P 1	Thompson, H. A., Adelaide, S.A.
1875		Thompson, Joseph, Bellevue Hill, Double Bay.
1877		Thompson, Thos. James, Pitt-street, Sydney.
1876		Thomas, H. Arding, Narellan.
1878		Thomas, F. J., Hunter River N.S.N. Co., Market-street.
1876		Tibbits, Walter Hugh, M.R.C.S. *Eng.*, "Carlisle," Petersham.
1876		Toohey, J. T., "Moira," Burwood.
1873		Trebeck, Prosper N., George-street.
1879		Trebeck, P. C., George and Margaret Streets.
1876		Trouton, F. H., A.S.N. Company's Offices, Sydney.
1877		‡Tucker, G. A., Ph. D., Superintendent, Bay View Asylum, Cook's River.
1868		Tucker, William, Clifton, North Shore.

Elected.		
1875		Tulloh, W. H., "Airlee," Greenwich Point Road, North Shore.
1875		Turner, G., 3 Fitzroy Terrace, Pitt-street, Redfern.
1876		Voss, Houlton H., J.P., Goulburn.
1879		Walker, H. O., Australian General Assurance Co., 129, Pitt-street.
1867		Walker, Philip B., Telegraph Office, George-street.
1870		Wallis, William, Moncur Lodge, Potts's Point.
1867		Ward, R. D., M.R.C.S. *Eng.*, North Shore.
1877		Warren, William Edward, M.D., M.R.C.S., 281, Elizabeth street, Sydney.
1876		Watkins, John Leo, B.A. *Cantab.*, M.A. *Syd.*, 121, Elizabeth-street.
1876		Waterhouse, J., M.A. *Syd.*, "Waima," Cavendish-street, Stanmore.
1876		Watson, C. Russell, M.R.C.S., *Eng.*, Morevale, Newtown.
1877		Watt, Alfred Joseph, Hastings, Moore Park Road.
1859		Watt, Charles, Government Analyst, New Pitt-street.
1876		Waugh, Isaac, M.B., M.C., *T.C.D.*, Parramatta.
1876		Webster, A. S., Union Club.
1867		Weigall, Albert Bythesea, B.A. *Oxon.*, M.A. *Syd.*, Head Master of the Sydney Grammar School, College-street.
1878		Westgarth, G. C., solicitor, Pitt-street.
1877		Weston, W. J., Union Club.
1879		‡Whitfeld, Lewis, B.A. (Sydney Univ.), Grammar School.
1874		White, Rev. James S., M.A., LL.D., *Syd.*, Gowrie, Singleton.
1875		White, Hon. James, M.L.C., "Cranbrook," Double Bay.
1877		White, Rev. W. Moore, A.M., LL.D., T.C.D., 1, Lawrening Terrace, Elizabeth-street.
1879		Wilshire, F. R., P.M., Berrima.
1879		Wilson, F. A. A., Mercantile Bank, Sydney.
1876		Windeyer, W. C., His Honor Judge, M.A., *Syd.*, King-street.
1876		Wise, George Foster, Immigration Office, Hyde Park.
1874	P 1	†Wilkinson, C. S., F.G.S., Government Geologist, Department of Mines.
1876		Wilkinson, Henry Toller, Department of Mines.
1878		Wilkinson, Rev. Samuel, 5, Argyle Terrace, Pitt-street, Redfern.
1880		Wilkinson, Robt. Bliss, 12, Spring-street.
1878		Wilshire, James Thompson, C.P.S., Scone.
1876		Williams, Percy Edward, Treasury.
1878		Wise, Henry, Savings' Bank, Barrack-street.
1873		Wood, Harrie, Under Secretary for Mines, Department of Mines.
1879		Woodhouse, E. B., Mount Gilead, Campbelltown.

Elected.		
1877		Woods, T. A. Tenison, Phillip-street, Sydney.
1876		Woolrych, F. B. W., Wilson-street, Newtown.
1872		†Wright, Horatio G. A., M.R.C.S., *Eng.*, Wynyard Square, *Hon. Treasurer.*
1878		Wright, Rev. Edwin H., St. Stephen's, Bourke.
1881		‡Wesley, W. H., "Stella House," Penzance, Cornwall.
1881		Wood, W. H. O'M., Surveyor General's Office.
1879		Young, John, Town Hall, George-street.

Honorary Members.

Limited to Twenty.

M. recipients of the Clarke Medal.

1875		Agnew, Dr., Hon. Secretary, Royal Society of Tasmania, Hobart Town.
1875		Barlee, His Excellency F. P., C.M.G., Governor of Honduras.
1879	M	Bentham, George, F.R.S., V.P.L.S., C.M.G., The Royal Gardens, Kew.
1875		Bernays, Lewis A., F.L.S., F.R.G.S., Brisbane.
1876	P 1	Cockle, His Honor Sir James, late Chief Justice of Queensland, M.A., F.R.S., Ealing, London.
1879		Darwin, Dr. Charles, F.R.S., M.A., F.G.S., F.L.S., &c., &c., Beckenham, Kent.
1876		De Köninck, Prof., M.D., Liège, Belgium.
1875		Ellery, Robert F., F.R.S., F.R.A.S., Government Astronomer of Victoria, Melbourne.
1875		Gregory, Augustus Charles, C.M.G., F.R.G.S., Geological Surveyor, Brisbane.
1875		Haast, Dr. Julius von, Ph. D., F.R.S., F.G.S., Professor of Geology, Canterbury College, and Director of the Canterbury Museum, Christchurch, New Zealand.
1875	P 1	Hector, James, C.M.G., M.D., F.R.S., Director of the Colonial Museum and Geological Survey of New Zealand, Wellington.
1880		Hooker, Sir Joseph Dalton, K.C.S.I., M.D., C.B., F.R.S., &c., Director of the Royal Gardens, Kew.
1879	M	Huxley, Professor, F.R.S., LL.D., F.G.S., F.Z.S., F.L.S., &c., &c., Professor of Natural History in the Royal School of Mines, South Kensington, London.
1875	M	M'Coy, Frederick, F.R.S., F.G.S., Hon. F.C.P.S., C.M.Z.S., Professor of Natural Science in the Melbourne University, Government Palæontologist, and Director of the National Museum, Melbourne.
1875	P 3	Mueller, Baron Ferdinand von, K.C.M.G., M.D., Ph.D., F.R.S., F.L.S., Government Botanist, Melbourne.
1879	M	Owen, Professor R., C.B., M.D., D.C.S., LL.D., F.L.S., F.G.S., V.P.Z.S., &c., &c., The British Museum, London, W.C.
1875		Schomburgh, Dr., Director of the Botanic Gardens, Adelaide, South Australia.

Elected.		
1878		Walker, Thomas, Yaralla, Concord.
1875		Waterhouse, F. G., F.G.S., C.M.Z.S., Curator of the Museum, Adelaide, South Australia.
1875	P 9	Woods, Rev. Julian E. Tenison-, F.G.S., F.L.S., Hon. Mem. Roy. Soc., Victoria, Hon. Mem. Roy. Soc., Tasmania, Hon. Mem. Adelaide Phil. Soc., Hon. Mem. New Zealand Institute, Hon. Mem. Linnean Soc., N.S.W., &c., Union Club, Sydney.

Corresponding Members.

Limited to Twenty-five.

1880	P 1	Clarke, Hyde, V.P. Ethnological Institution, London.
1879	P 2	Etheridge, Robert, junr., F.G.S., &c., The British Museum.
1880		Miller, F. B., F.C.S., Melbourne Mint.
1880		Ward, Sir Edward, K.C.M.G., Major-General, R.E., Cannes, France.

Obituary, 1881.

1876		M'Carthy, W. F.
1861		Paterson, Hugh.

AWARDS OF THE CLARKE MEDAL.

Established in memory of

The late Revd. W. B. CLARKE, M.A., F.R.S., F.G.S., &c.,

Vice-President from 1866 *to* 1878.

To be awarded from time to time for meritorious contributions to the Geology, Mineralogy, or Natural History of Australia, to men of science, whether resident in Australia or elsewhere.

1878. Professor Richard Owen, C.B., F.R.S., The British Museum.

1879. Mr. George Bentham, C.M.G., F.R.S., The Royal Gardens, Kew.

1880. Professor Huxley, F.R.S., The Royal School of Mines, London.

1831. Professor F. M'Coy, F.R.S., F.G.S., The University of Melbourne.

1882. Professor James Dwight Dana, LL.D., Yale College, New Haven, Conn., United States of America.

ANNIVERSARY ADDRESS.

By the Hon. Professor Smith, C.M.G., &c., &c., President.

[*Delivered to the Royal Society of N. S. Wales*, 4 *May*, 1881.]

Gentlemen,

At this the close of my Presidential year—the first year, I may remind you, in which the Chair has been occupied by an elected President—it becomes my duty to go through the form of an Annual Address, before proceeding to the more pleasing ceremony of laying down office and introducing my successor. It is a wise provision in our by-laws that the President can hold office for only one year; but in spite of that, I fear that this annual address will tend to become more and more irksome, and may on some occasions stand in the way of desirable members taking office,—members who may not have much leisure nor much fluency, and who might look upon the task of composing an address as more than counterbalancing the honor of the position, and the gratifying sense of enjoying the confidence of their fellow-members. I now throw out the suggestion for the benefit of my successors, that while the Society is comparatively young, and its forms and routine yet in the plastic condition, it might be well to accept as an annual address a mere statement of the condition of the Society and its work of the preceding year. Occasionally, no doubt, the President might be glad to embrace the opportunity of stating his views on some questions of general interest, not perhaps well suited for a paper of the usual character at a monthly meeting, and not intended for discussion; and in such a case as that, when the President has really something to say, the members will doubtless be pleased to listen, but in ordinary

cases I believe the members would be glad to let the President off with a brief formal statement of the character indicated. I am unwilling however to be the first to break in abruptly upon an established custom, and in looking about for some appropriate subject on which to found an address, it has occurred to me that now we have completed a quarter of a century of continuous and active existence, a brief review of the work accomplished might not be uninteresting—the more so as the Royal Society is occasionally twitted with indolence, and even the members themselves probably do not realise that on a fair view of the case, and making due allowance for unfavourable circumstances, the Society has been the means of giving publicity to a large amount of intellectual effort, and of persevering and laborious scientific research.

Review of past History of the Society.

I have said that we have had a continuous active life of five-and-twenty years; that estimate includes of course the Philosophical Society that preceded us; but as there was a mere change of name effected in 1866, without any interruption of business, we have a right to go back to 1856, when the Philosophical Society began its work. It would not be unfair indeed to claim an existence of sixty years, for undoubtedly the first beginning of this scientific organisation is to be traced back to 1821, when the Philosophical Society of Australasia was constituted, with ten members, under the presidency of Sir Thomas Brisbane. But that original Society did not long survive. It is mentioned among the Institutions of Sydney in the Australasian Almanac for 1825, and not afterwards. The only record known of papers read before it is in the Geographical Memoirs of New South Wales, by Mr. Justice Field, published in 1825. In that volume four papers are reprinted in full, the titles of which are given in the Inaugural Address of the Rev. W. B. Clarke, in 1867. Besides the reading of papers, that Society engaged in another public act which has better served to perpetuate its name. In March, 1822, it caused a tablet to be affixed to the rocks on the South

Head of Botany Bay, to commemorate the landing of Captain Cook. The inscription is given in the Gazette of 22 March, 1822, as follows:—

A.D. MDCCLXX.

UNDER THE AUSPICES OF BRITISH SCIENCE,

THESE SHORES WERE DISCOVERED

BY

JAMES COOK AND JOSEPH BANKS,

THE COLUMBUS AND MÆCENAS OF THEIR TIME.

THIS SPOT ONCE SAW THEM ARDENT

IN THE PURSUIT OF KNOWLEDGE;

NOW,

TO THEIR MEMORY THIS TABLET IS INSCRIBED,

IN THE FIRST YEAR

OF

THE PHILOSOPHICAL SOCIETY OF AUSTRALASIA,

SIR THOMAS BRISBANE, K.C.B., F.R.S.L. AND E.,

(CORRESPONDING MEMBER OF THE INSTITUTE OF FRANCE),

PRESIDENT.

A.D. MDCCCXXI.

In Mr. Clarke's inaugural address in 1867, particulars are given of the resuscitation in 1850 of the old Society, under the name of the Australian Philosophical Society; but there must have been an attempted revival at an earlier date, for in the New South Wales Calendar, of 1832, I find mention made of an "Australian Society" for promoting colonial products and manufactures, under the presidency of Mr. Samuel Terry. I cannot, however, find any other reference to it. The 1850 Society began under favourable auspices, and with influential leaders; but the gold fever of 1851-2 seems to have sapped its vitality, and for two or three years nothing is heard of it, until in July, 1855, it met once more and resolved to make a fresh start, under the name of the Philosophical Society of New South Wales. It seems that twenty-two Members passed over from the old Society to the new, and they brought with them £88 to start the funds of the new

Association. Under the active presidency of the Governor-General, Sir W. T. Denison, the Philosophical Society speedily attained a considerable amount of popularity. It held its first meeting in the School of Arts, on 9th May, 1856, and at the next meeting ninety-one new Members were elected. About forty more were added during the remainder of the year; and fourteen papers were read, two being by the President. The place of meeting was speedily changed to the hall of the Australian Library, now the Free Public Library, where it remained, with occasional migrations to the Exchange, till the formation of the Royal Society, which also continued its meetings at the Library till 1869, when it moved to the Exchange, and continued there till May, 1875, when it occupied the present building, first as tenant of the Academy of Art, and finally as proprietor in 1878.

The early prosperity of the Philosophical Society yielded after a few years to the usual reaction that we are only too familiar with in all new organisations attempted in Sydney. Perhaps also it suffered from the partial withdrawal of vice-regal patronage, if that, however, was not rather an effect than a cause of waning popularity. Sir W. Denison was not only largely instrumental in starting the Society, but he continued during his term of office to attend the meetings and to take a lively interest in the proceedings. On his leaving the Colony at the close of 1860, the Society presented him with an address, in which the following words occur:—"We desire to express our warm acknowledgments for the services you have rendered to the Society, and to the cause of science generally. * * * * To your successful exertions at an early period after your arrival in the Colony we are indebted for the reorganisation of the Society on a satisfactory basis, &c." His successor, Sir John Young, afterwards Lord Lisgar, frequently presided over the monthly meetings, but as the attendance dwindled away he came to the conclusion that his presence was not beneficial. In his remarks at the close of the Rev. Mr. Clarke's inaugural address to the Royal Society, in July, 1867, he is reported to have spoken as follows:—"His Excellency

expressed his sincere hope that the Society would be more successful under its new name than it had been under its former designation. He had regularly attended the monthly meetings of the Society for some time after his arrival in the Colony. He observed, however, as time went on that the attendance became 'small by degrees and beautifully less,' until on one occasion that he had come there to preside, he found himself the only person present to hear a paper which some gentleman was there to read. He believed that Professor Smith was sent for, and formed with him the sole audience. After that he had rather held back, being under the impression that vice-regal patronage was not quite so beneficial to the Society as could be wished."

Sir John Young was succeeded in the presidency by the Earl of Belmore, who took the Chair two or three times at monthly meetings, and since then we have not been favoured with the vice-regal countenance.

I have stated that in the first year of the Philosophical Society about 130 new members were admitted. In the second year there were only thirty-nine; while in the third the number dwindled down to seven. After that there was some improvement for two years, but in 1861 the number again dropped to six, and in 1863 only one new member joined. In each of the following years nine joined, and lastly in 1866 (the transitional year) only one.

Not only did new members fail to come in, but the old dropped steadily off, as shown by the decreasing amounts paid as annual subscriptions. In the first year the income of the Society was £316, in addition to the £88 brought over from the old Society. In the second year the income was £205; in the third, £106; after which it kept higher for a few years, till in 1863 it dropped to £88, and in the last year of the Society (1866) it reached its lowest depth at £43. If the expenditure of the early years had not been very moderate, so that a surplus was preserved for bad times, the Society must have died of inanition. Indeed, it frequently became a question whether it was worth while continuing

what seemed a hopeless struggle; and it was sometimes suggested that the Society should be dissolved, and the remaining assets used up in a picnic or a dinner.

For several years the expenditure, although rigorously kept down, was considerably over the income, and the Society lived on its early savings. In such a state of the finances, it was of course impossible to undertake the publication of the Transactions. In the first years the Society was entirely dependent on the newspapers for giving publicity to its proceedings; but these were frequently of too abstruse a character for such a mode of publication. Afterwards, when Mr. James Waugh started the Magazine of Science and Art, the papers of the Society were regularly published in it; but that magazine lasted only a few years, and then the Society published one volume of Transactions, containing a selection of papers read from 1862 to 1865. A complete list of the papers read before the Philosophical Society has never hitherto been made public, and I have thought it worth while to make such a list from the minutes and put it here on record. It will be seen that, in spite of failing membership and income, a large amount of useful scientific work was accomplished.

Philosophical Society Papers.

1856.

May 9. "Development of the Railway System in England, with suggestions as to its application to the Colony of N. S. Wales." His Excellency Sir W. T. Denison, Governor-General.

June 13. Two papers on "Steam Communication with England." Hon. E. Deas-Thomson, C.B.

July 11. "Means of constructing Railways, financially considered." W. G. Pennington. "Application of certain principles of Political Economy to the question of Railways." Professor Pell.

August 13. "On the action of Sydney Water upon Lead." Professor Smith. "On the Iron-making resources of N. S. Wales." Mr. Thomas.

Sept. 10. "Electric Telegraphs and Railways between Sydney and London not impossible." John Thompson, Deputy Surveyor-General. "On Sanitary Reform." Dr. Aaron.

Oct. 8. "On the Parramatta Waterworks." E. O. Moriarty.

Nov. 12. "On Irrigation." Sir W. T. Denison.

Dec. 10. "On the necessity for a further exploration of the Interior of the Australian Continent." John Thompson. "The Science of Statistics." C. Rolleston. "On a new Grate for burning Wood." Thos. Woore.

1857.

June 10. "On Pavements." Lieut. Vigors. "On the Sanitary condition of Sydney." C. Rolleston.
July 8. "On the Moon's Rotation." Sir W. T. Denison. "On a new Sun-gauge." W. S. Jevons. "On Sanitary Reform." Dr. Bland.
Aug. 12. "On Railways." Sir W. T. Denison. "On Railways, with reference chiefly to the motive power." F. S. Peppercorne.
Sept. 9. "On the Waxed-paper process of Photography." F. Haes.
Oct. 14. "On the Poison-apparatus of Venomous Snakes." Alfred Roberts. "On the Meteorology of N. S. Wales." Rev. W. Scott.
Nov. 11. "On the use and abuse of Tobacco." Dr. Berncastle.
Dec. 9. "On the Formation of Clouds." W. S. Jevons.

1858.

May 12. "On the strength and elasticity of Woods of N. S. Wales and New Zealand." Captain Ward, R.E.
June 9. "Abridgment of a book of papers relating to the history and practice of Vaccination." Dr. Greenup.
July 14. "On the Poison-apparatus of Venomous Snakes, with a description of some of the species found in this Colony." Alfred Roberts.
Aug. 11. "On the Meteorology of N. S. Wales." Rev. Wm. Scott. "On the Clunes Mine, Victoria." H. A. Thompson. "Gold Deposits of Victoria." H. A. Thompson. "Outline of a plan for the formation and working of a Mining Company to open out the Quartz-fields of N. S. Wales." H. A. Thompson. "On the Mortality of Sydney." C. Rolleston.
Sept. 8. "On the present state of the Supply of the Ores of Mercury." Rev. W. B. Clarke. "On the filtration of Water through Sand." Sir W. T. Denison.
Oct. 13. "On the Construction of Dams." Professor Pell. "On Currency and Banking in N. S. Wales." Edward R. Drury.
Nov. 10. "On the Plurality of Worlds." Rev. W. Scott.
Dec. 8. "On the Progress of Photography." James Freeman.

1859.

June 8. "On the construction of Specula for Reflecting Telescopes." H. A. Severn. "On Atmotic Navigation." Dr. Bland.
July 13. "On the means of deodorizing and utilizing the Sewage of Towns." C. Rolleston. "On a new mode of using Canada Balsam, &c., in mounting microscopic objects." Alfred Roberts.
Aug. 10. "On the Observatories of the Southern Hemisphere." Rev. W. Scott. "Analyses of certain Colonial Coals." Captain Ward. "On the Adulteration of Milk in Sydney." Members of Microscopical Committee.
Sept. 21. "On Telegraphic Communication with England." F. Gisborne.
Oct. 19. "On the Sydney Observatory." Rev. W. Scott.
Nov. 16. "On the Separation of Gold from Mundic Quartz." Professor Smith.

1860.

June 20. "On the Sydney Observatory." Rev. W. Scott.
July 18. "Memoranda referring to the destruction of the dam at Liverpool." E. O. Moriarty. "On the detection of spurious gold." F. B. Miller.
Aug. 15. "On the Quartz Reefs of Upper Adelong." Prof. Smith.
Sept. 19. "On Bridge-building." Sir W. T. Denison. "On a Dial to prevent collisions at Sea." C. J. Perry.
Oct. 17. "On compass-deviation in Iron Ships." Rev. W. Scott. "On Ozone." Mr. Proschel.
Nov. 21. "On the Mundic Quartz of Adelong." Dr. Leibius.

1861.

June 19. "On the Census of 1861." C. Rolleston.
July 17. "On the Sydney Observatory, &c." Rev. W. Scott.
Aug. 14. "On a new species of Foraminiferous Shell from Ovalau, Fiji." Alfred Roberts. "On the improvements in the navigation of the Hunter River." E. O. Moriarty.
Sept. 11. "A brief notice of a few of the little known scrub timbers of the Colony." Charles Moore. "On a new mode of constructing timber Bridges." Thos. Woore. "On a new method of giving support to Railway Bars." Thos. Woore.
Oct. 9. "A short description of the new works now being carried out for the improvement of Wollongong Harbour." E. O. Moriarty.
Nov. 20. "On some recent geological discoveries in Australasia, and the correlation of the Australian formations with those of Europe." Rev. W. B. Clarke.

1862.

June 11. "On the Cave Temples of India." Dr. Berncastle.
July 9. "Geometrical Researches, in four papers, comprising numerous new theorems and porisms and complete solutions to celebrated problems." Martin Gardiner. "On the Wambeyan Caves." Dr. J. C. Cox.
Aug. 13. "On the desirability of a systematic search for, and observation of, variable Stars in the Southern Hemisphere." John Tebbutt. "On the performance of the steamer 'Diamantina' between Sydney and Brisbane." Commodore Seymour.
Sept. 10. "On the Vertebrated Animals of the Lower Murray and Darling; their habits, economy, and geographical distribution." Gerard Krefft.
Oct. 8. "On the Comet of Sept., 1862." John Tebbutt.
Nov. 12. Second paper on the same subject, by John Tebbutt.

1863.

May 27. "On Snakes observed in the neighbourhood of Sydney." Gerard Krefft.
June 17. "On Snake-bites and their Antidotes." Dr. Berncastle. "A complete solution of a celebrated problem." Martin Gardiner.
Aug. 12. "On the correct scientific method of forming Railway Curves, &c." Martin Gardiner.
Sept. 17, "On the Vertebrated Animals of the Lower Murray" (second paper). Gerard Krefft.
Nov. 11. "On ancient flint Implements found near Abbeville." Prof. Smith. "Description of a new Fish from the Hawkesbury." Gerard Krefft.

1864.

Aug. 17. "On improved analytic Geometry." M. Gardiner. "On the probable reasons that led Fahrenheit to the adoption of his peculiar thermometric scale." Prof. Smith.

Sept. 7. "On Australian Storms." John Tebbutt. "Remarks on the preceding paper." Rev. W. B. Clarke.

Oct. 5. "On Fibre-bearing Plants indigenous to the Colony." Chas. Moore.

Nov. 2. "On Osmium and Iridium obtained from N. S. Wales Gold." Dr. Leibius.

Dec. 7. "On the prospects of the Civil Service of N. S. Wales under the Superannuation Act of 1864." Colonel Ward. "On the distribution of profits in Mutual Life Assurance Societies." Professor Pell.

1865.

May 10. "On the Transmutation of Rocks in Australasia." Rev. W. B. Clarke.

July 5. "On the Oology of Australia." Ed. Ramsay.

Aug. 2. "On the theory of Encke's Comet." G. R. Smalley. "On the Manners and Customs of the Natives of the Lower Murray and Darling." Gerard Krefft.

Sept. 6. "On the Defences of Port Jackson." G. A. Morell. "On the geological position of the Petroleum Coal." Wm. Keene.

Oct. 11. "On certain possible relations between Geological Changes and Astronomical Observations." G. R. Smalley.

Nov. 8. "On the Geology and capabilities of the Cape York Peninsula." Dr. Rattray.

Dec. 6. "On the present state of Astronomical, Magnetical, and Meteorological Science." G. R. Smalley.

1866.

July 4. "On the Ornithology of Lake George." Ed. Ramsay.

Aug. 1. "Preliminary remarks on the Magnetical Survey of N. S. Wales." G. R. Smalley. "On the Dentition of *Thylacoleo carnifex*." Gerard Krefft.

Sept. 12. "Remarks on the support of the Young of Marsupial Animals in the Pouch." Ed. Bedford.

Oct. 3. "On the genus Trigonia." Dr. J. C. Cox.

Nov. 7. "Remarks concerning a new species of Fagus." Charles Moore. "On the Classification of the small Marsupial Insectivora." Gerard Krefft.

Dec. 12. "On the condition and resources of the Colony." C. Rolleston.

In the eleven years of the Philosophical Society's existence it held eighty-three meetings, at which 107 papers were read by forty-three members. The largest number (eight) was read by the Revd. W. Scott, who long held office in the Society. Mr. Krefft, at that time Curator of the Museum, read seven; Sir William Denison and Mr. Rolleston, each read six; I read five; Revd. W. B. Clarke, Mr. Smalley, Mr. Alfred Roberts, Mr. Moriarty,

Mr. Tebbutt, and Mr. Gardiner, each four; six members read three each; seven members two each; and nineteen members one each.

Besides the reading of papers, other means were tried to keep up the interest of the members. A Microscopical Committee was formed, and held several meetings, some at Government House, with fair attendance, but it soon collapsed. Conversaziones were frequently held, at first on a modest scale, in the Australian Library, but soon expanding so as to require the Chamber of Commerce, which ultimately became overcrowded with the numerous objects of interest and with visitors. The Royal Society has carried on these gatherings with great success. This branch of our operations has indeed always been very popular. It furnishes the only opportunity we have as a Society of enjoying the presence of ladies, but at the same time it is increasingly troublesome and expensive. We were driven from the Chamber of Commerce to the Masonic Hall, and from that to the great Hall of the University, and even there we were seriously cramped for room, the striking display of scientific and artistic objects requiring a great deal of space, and the visitors numbering over 800. Last year the Council did not see their way to attempt a conversazione on an extended scale, but they invited the members to a similar gathering, although without ladies, in the Society's rooms, and they have reason to believe that a pleasant evening was spent. It is hoped that during the present year, probably in September, we may have the pleasure of again meeting the members with the ladies of their families, at a conversazione of the former character, in some capacious and central building.

But to return for a little to the old Philosophical Society. In 1865, when the income had dropped to £58, which was £30 less than the expenditure, the necessity for some change of organization became apparent, if the Society was to be saved from total extinction. The Council, after discussing the matter, appointed a sub-committee, consisting of Mr. Smalley and Mr. Bedford, to draw up a report for submission to the general body of members.

This report having been first agreed to by the Council, was brought up at the monthly meeting on 11th October, and there discussed and adopted. Its preamble states :—

"Considering the languishing condition of this Society, we are of opinion that some effort should be made to restore its vitality and raise it to the important and useful position that it ought to occupy." The report goes on to say that it is not easy to account for the decline of the Society, but that it may be partly owing to its name, which conveys the impression that the subjects discussed are of an abstruse and exclusive character. The Report recommends that the name should be changed to "Royal Society," and an outline is given of a proposed constitution.

A Committee was then appointed to draw up rules, and application was made to the Governor for sanction to the change of name, but the answer received was that the application must be forwarded to the Secretary of State for the Colonies. It was not till the last meeting of 1866 (December 12) that a copy of Lord Carnarvon's despatch, dated 24th September, was laid before the Society. It contained these words—"Her Majesty has been graciously pleased* * *to sanction and approve of the Philosophical Society in future assuming the title of the Royal Society of New South Wales." Thus the change was finally completed, and the name Philosophical, which had been considered inappropriate, was dropped.

Prosperity however did not come with a rush to the new organisation. Still there was a decided improvement, for in 1867 the new accessions were twenty, and the income got up to about £80. If we compare this sum with the published list of members for 1867, which contains 108 names, we are obliged to infer that nearly half the members had not paid their subscriptions. In 1868 the new members were thirty-seven; in 1869 only fourteen; in 1870 they rose again to twenty-one, and the income was £112; but in the following year only five new members joined, and the income fell to £80, while the expenditure was £111.

The printing of the Transactions was a great burden in those years, and the want of means prevented some of the papers being properly illustrated; but in 1872 the Government liberally consented to have the annual volume brought out at the Government Printing Office, without cost to the Society, except in the matter of certain illustrations.

The tide of prosperity in the affairs of the Society which we still enjoy first set in when we took possession of this building in 1875, and appointed Professor Liversidge and Dr. Leibius to act as our Secretaries. To the enlightened zeal and indefatigable labours of these gentlemen we owe much of our present position. In 1875 the income rose suddenly to £222, and in the following year to £413. In that year (1876) amended By-laws were passed; Sections were organized to represent such branches of scientific study as were thought likely to bring members together for quiet conference and mutual aid; and arrangements were completed for exchange of scientific publications with kindred Societies in different parts of the world. Last year we sent out 1,013 copies of our Transactions and certain Colonial reports to 284 Institutions and representative persons in 116 different places throughout the civilized world; and from 167 of these Institutions we received publications in return to the number of 749, some of them of great value. In addition to these gifts we have been in regular receipt of a considerable number of leading periodicals, and we have been buying scientific works as our funds would permit; so that our library is now fairly stocked with standard books and periodicals in science, literature and art.

In 1877 we began to collect funds for the purchase of our present building, obtaining also the promise of the Government to grant £1 for every £2 subscribed. The Government at the same time liberally agreed to augment at the same rate our ordinary subscriptions, to meet current expenses.

In 1878 the accounts show for the first time a Government grant of £200, in addition to the ordinary subscriptions of £433. The special subscription for the building amounted to £1,000, which

enabled us to claim £500 from Government. We then completed the purchase for £3,525, paying down £1,525, and borrowing £2,000 on mortgage. It is highly desirable that this debt should be paid off, and I trust the members will make an effort towards that end during the present year. Were that accomplished, there would be £120 additional for promoting the proper objects of the Society. It is the more necessary to get rid of this annual charge for interest, inasmuch as, without the Government subsidy which we now enjoy, it would be necessary to economise to such an extent as to endanger the efficiency of our operations. Now the Government subsidy is obviously of uncertain duration—it depends upon an annual vote of the Legislature; and should bad times come, so as to diminish materially the public revenue, we must expect to be among the first to suffer from the inevitable cutting down of expenditure.

There is still another reason why something should be done this year to add to the building fund. Hitherto a vacant space has adjoined the Society's house on the south side; it is probable that this will now be built upon, and it may be expedient for the Society to buy a few feet of the frontage in order to preserve the light and ventilation of this hall in which we meet. But without additional subscriptions such a purchase could not be made. Might I venture to suggest that the old members who pay only one guinea per annum should for at least this year double their subscription to help us in reducing our debt.

To conclude now what I have to say on the financial progress of the Society, I will state the ordinary income and expenditure (omitting building fund) for each of the past six years, being the time that we have occupied the present building; and to that I will add the number of ordinary members elected each year. I throw these statistics into tabular form:—

Year.	Income— From Members.	Income— From Government.	Expenditure.	New Members.
1875	... £222	... — ...	£214	... 41
1876	... 413	... — ...	389	... 132
1877	... 433	... £200 ...	703	... 62
1878	... 516	... 250 ...	581	... 78
1879	... 463	... 236 ...	682	... 51
1880	... 605	... 250 ...	812	... 38

The falling off in new members last year may partly be accounted for by the fact that the entrance fee and annual subscription had been doubled by a resolution adopted towards the close of the previous year; but that this was not the only reason, or even the chief reason, is made probable when we compare 1879 with 1878, the falling off between these two years having been greater than between 1879 and 1880. The accession of new members fluctuates very considerably year by year, and no special reason can be adduced. In September last the Society adopted a resolution to limit the number of members to 500, and as the number on the roll is now about 460, this resolution may become operative before long. It is difficult, however, to state exactly the effective membership, as names are kept on the roll for one year after a subscription has been paid, unless it is definitely known that a member has retired.

Work of last Year.

In regard to the proper work of the Society during last year I find that ten meetings were held (including two adjournments) besides a special meeting to hear a lecture from Mr. Lant Carpenter on recent practical applications of Electricity in America; and a social meeting or Reception by the Council. No fewer than twenty-eight papers were read by thirteen members, of which our Hon. Sec., Professor Liversidge, contributed nine, and our Vice-President, Mr. Russell, contributed five. The year is remarkable not only for the number of papers but for their quality, many of them involving much hard work and troublesome research. The following is a list of the papers under their respective dates:—

12 May. Annual Address, Charles Moore, Vice-President.

2 June. "On the Longitude of the Sydney Observatory." John Tebbutt. "On the Opposition and Magnitudes of Uranus and Jupiter." John Tebbutt. "On the Acids of the Native Currant." E. H. Rennie. "On some new double Stars, with remarks on several Binaries." H. C. Russell, Vice-President.

7 July. "Catalogue of Plants collected during Mr. Alex. Forrest's geographical exploration of N. W. Australia in 1879." Baron Von Mueller. "The Orbit elements of Comet I, 1880." John Tebbutt. "On Ringbarking and its effects.' W. E. Abbott.

4 Aug. "Notes on a collection of Fossils from the Palæozoic Rocks of N. S. Wales." R. Etheridge, jun. "On Geological Observations made in 1876, in Queensland, N. S. Wales, Victoria and Tasmania." Dr. Feistmantel. "A new method of Printing Barometric and other Curves." H. C. Russell, Vice-President.

1 Sept. "On Hot-spring Waters from New Britain and Fiji." Prof. Liversidge. "On the Composition of Cast Iron acted on by sea-water." Professor Liversidge. "On a new Barometer Table." H. C. Russell, Vice-President.

6 Oct. "On the Composition of Coral-limestone." Professor Liversidge. "On the inorganic Constituents of the Coals of N. S. Wales." W. A. Dixon. "A comparison between the Prospect and Kenny Hill schemes of Water Supply for Sydney." F. B. Gipps.

3 Nov. "On some N. S. Wales Minerals." Professor Liversidge. "On Piturie." Prof. Liversidge. "On Salt-bush and Native Fodder Plants." W. A. Dixon. "On Wells on the Liverpool Plains." T. K. Abbott.

1 Dec. "On some recent changes on the surface of Jupiter." H. C. Russell. "On Thunder and Hail Storms." H. C. Russell. "Remarks on the Colours of Jupiter's Belts, and some changes observed thereon during the opposition of 1880." G. D. Hirst.

8 Dec. "On a specimen of Fossilized Wood." "On the Composition of some N. S. Wales Coals." "On the composition and microscopic structure of some N. S. Wales Rocks." "On the Barratta and Bingera Meteorites." All by Professor Liversidge.

At the same meeting of 8th December, it may be remembered that a draft Act of Incorporation was submitted and adopted. Circumstances have hitherto prevented this being presented to the Legislature, but the Council will endeavour to get it passed in the next session of Parliament.

Since the commencement of the Royal Society there have been 102 general monthly meetings, besides numerous adjournments. We have had 166 papers at the general meetings, and about 40 more at the Sections. These papers represent a very fair amount of scientific labour, quite as much as could reasonably be expected, considering our circumstances and the busy lives that most of us lead. At all events our existence as a Society, and our claims to public support, are sufficiently justified by these results. I have not considered it necessary to bring together a complete list of the papers, as I did for the Philosophical Society, as they are all to be found in the successive volumes of our Transactions.

The Clarke Memorial.

The steps that were taken in 1878-9 to commemorate our late Vice-President, the Rev. W. B. Clarke, must be fresh in your recollection. It was determined that a bronze medal should be struck, and presented from time to time to men of science, who have made valuable contributions to our knowledge of the Geology, Mineralogy, or Natural History of Australasia. The execution of the medal was entrusted to Messrs Wyon, of London, and we have lately got from them the first specimen, which is now exhibited. It is a creditable work of art, and will, we trust, be esteemed by its recipients. Through the kindness of Mr. Hunt, copies will hereafter be struck at the Sydney Mint as required. The Council has now made four awards of this medal as follows: —For 1878, to Professor Owen, for his long-continued researches on the Palæontology of Australia, especially for his series of papers to the Royal Society of London, on the Fossil Mammals of Australia. For 1879, to Mr. George Bentham, for his splendid work in conjunction with Baron Von Mueller, on the Botany of Australia. For 1880, to Professor Huxley, for his contributions to the Natural History of this country ever since he visited our shores in the "Rattlesnake"; and, for the present year, to Professor M'Coy, of Melbourne, for his numerous contributions to the Palæontology and Natural History of Australia. We have not yet been able to actually present the medal to any of these gentlemen, but trust this will be accomplished very soon.

Biological Laboratory for Sydney.

I have now to request your kind attention a few minutes longer, while I bring before you a matter for which I wish to enlist your sympathy, in the hope that there may be a practical outcome of that sympathy in the shape of pecuniary contributions.

I have already placed before you our need of further contributions in aid of the Building Fund, and I feel some reluctance in pressing the claims of any other scheme, even although it is one very closely connected with, and directly intended to further the objects of this Society. It is probably within your knowledge

that the well-known Russian naturalist, Baron Maclay, has for two or three years been endeavouring to establish a Zoological Station in the neighbourhood of Sydney. He has so far succeeded in his efforts that an eligible site at Watson's Bay has been obtained from the Government, and considerable progress has been made with the building upon that site. The Government has also liberally engaged to double the subscriptions up to £300; but the necessary sum of £300 has not yet been made up, and what I have to ask of you to-night is to help to make it up, so that the corresponding sum may be claimed from the Treasury. I am assured by Baron Maclay, that for £600 the building can be fitted for use—not well fitted certainly—and more would have to be done afterwards; but it is thought that when the public utility of the establishment is proved, there may be less difficulty in getting further contributions towards perfecting the arrangements. I must, however, say at once that it is my hope and expectation that the Royal Society will not only assist in completing the building in the first instance, but that they will agree to devote a fixed sum annually towards its future support.

It may, however, be asked by those not familiar with the idea of a zoological station, what claims it has on a Society like ours. An answer to that will involve some account of the purpose of such stations, and what has been done in them in other parts of the world. In a paper read before the Linnæan Society of New South Wales, by Baron Maclay, in 1878, he defines a zoological station as "a laboratory established for conducting investigations in Anatomy, Embryology, Histology, and if possible, Physiology as well." As plants as well as animals may be thus investigated, the Baron would prefer the name "Biological Laboratory" to that hitherto in use. He points out that "most scientific travellers have hitherto devoted their time and energies to collecting, and that often in the field of several sciences," and thinks that "the time has arrived when this method should be abandoned, and that in place of mere collecting, the great aim of travel should be observation and investigation, exercised immediately and upon the spot." He recounts his own experience in different parts of the

world, and shows how time and opportunities may be lost through the want of a suitable place for undisturbed work. It was, indeed, from the personal experience of Baron Maclay and Dr. Dohrn, while working together at Messina in 1868, that the idea of establishing zoological stations first arose. In the following year the question received a further impulse at a Congress of Naturalists at Moscow; and under the care of Dr. Dohrn, and chiefly at his own expense, the first practical realization of the idea was obtained at Naples, where a zoological station was opened in 1875. Other stations followed in Europe and America, but even yet there are only about half a dozen in all. The success of the station at Naples has been most marked. It is now a large establishment with a very complete equipment, not only in the building but in out-door appliances as well, such as boats (including a steamer), dredges, diving apparatus, &c., and in the early part of this year, as I learn from a letter addressed to Baron Maclay by Dr. Dohrn, there were twenty-five men of science carrying on original investigations with paid assistants to the number of thirty-four. Three scientific periodicals are kept up by contributions from that station. The expenses of such an establishment are necessarily large, and are met partly by payments for tables used, and partly by liberal donations from the German Government. The charge for a table is £75 per annum. Several of these tables are subscribed for by scientific bodies, who then acquire the right of nominating a worker. The British Association, for example, pays for a table, and sends from time to time naturalists who have to report to the Association the results of their labours. A committee of the Association makes an annual report on the subject and summarises what has been done during the year. In the report presented last year it is stated that the establishment had been placed upon a more secure footing than previously by a grant from the German Government equivalent to £1,500, and which was understood to be annual. No return is asked for this liberal grant, and separate States pay for the hire of tables in the usual way. Prussia pays for three tables, and five other States one each. Prussia also votes £150 annually towards the publications of the station; and the Berlin Academy

voted £100 last year for the same purpose, making altogether £2,350 from Germany alone—"a truly noble support," remarks this report, "when it is borne in mind that the nation has no greater direct participation in the advantages of the station than any other country or association that may hire a table."

The report further states that arrangements were being made for the establishment of a small station at Messina as a dependency of the one at Naples, and that for this additional advantage several lessors of tables have agreed to raise their contributions from £75 to £90, and the Committee recommend the British Association to follow this example.

As many working naturalists have very little money to spare for travelling, Dr. Dohrn has set on foot a scheme for the foundation of a travelling fund for the benefit of naturalists who may be nominated for the tables, and in his recent letter to Baron Maclay, he expresses a hope that something of the same kind will be done for the proposed station at Sydney. The report to the British Association concludes with a list of eighteen papers that had been published during the year by workers at the Naples station, together with a long list of naturalists to whom specimens and microscopic preparations had been sent from the station.

From this brief notice of the zoological station at Naples —the first and best of these modern institutions for the practical study of living organisms — I turn again to the more modest establishment that Baron Maclay has initiated here. He has pointed out in his paper to the Linnæan Society that Australia is a tempting field for a zoological station. He says—"Next after the tropics (which are the richest in animal life) the widest field offered to the investigator of nature, and consequently the most suitable region for the establishment of zoological stations is Australia, with a fauna so interesting, so important, and so very far from sufficiently known, especially as regards anatomy and embryology. Such a country would be the place for a zoological station, or to speak more correctly, for several such stations." And for beginning the work in Australia, the

most central and suitable place he considers is Sydney. The site granted by the Government is in a pleasant and convenient situation at Watson's Bay. The building, now approaching completion, is a neat cottage providing five work-rooms and two bed-rooms, besides store-room and bath-room in the basement. It is not intended to make a charge for each table or work-room, as at Naples, but every naturalist making use of the building will be expected to contribute a small sum, say 5s. a week, towards paying a caretaker. It is not supposed that this will meet current expenses, and I have ventured to express the hope that this Society will not only contribute at present to the cost of building, but will hereafter grant an annual sum for maintenance. The first should be done by individual members, the second by the Council on behalf of the Society generally. The Royal Society of Victoria, in conjunction with members of other three Societies there, have agreed to give a subscription for the building, and an annual sum for maintenance, and the Royal Society of N. S. Wales will not, I trust, be behindhand in this scientific enterprise, especially as our metropolis will have the honor of setting agoing the first zoological station or biological laboratory in the southern hemisphere.

Conclusion.

With this address my duties as President come to an end; and as soon as I have read to you the report of the scrutineers on the ballot just taken I will cede the Chair to my successor. I will simply in conclusion express the pleasure I have had in presiding over your meetings, and my hope that your newly elected President will have an equally pleasant year of office, and have as much solid work to pass in review as has been accomplished in the past year.

The Climate of Mackay.

By Hy. Ling Roth, F.M.S., &c.

[*Read before the Royal Society of N.S.W., 1 June, 1881.*]

Mackay is a port on the east coast of Australia, in the Colony of Queensland, on the Pioneer River, the centre of a rich and thriving sugar-growing district.

The landing-place at Flat-top Island, at the mouth of the river, is situated in lat. 21° 9′ 19″ south, and long. 149° 14′ 11″ east, which would give as the position of the centre of the town, lat. 21° 10′ 25″ south, and long. 149° 10′ 35″ east.

The district was discovered in 1861 by Mr. John Mackay, and the mouth of the Pioneer River was surveyed by Capt. Heath, R.N., in 1862.

Meteorological Observations taken at "The Hollow" (Messrs. C. C. & E. S. Rawson).

"The Hollow" is situated about 20 miles due west of the town of Mackay, on the right bank of the Pioneer River, and about 200 feet above sea-level.

Observations were instituted at the suggestion of the late Mr. John Waterhouse, F.R.S., F.M.S., &c., &c., of Well Head, Halifax, Yorkshire, England, who originally sent out the instruments.

Observations are taken daily at 8 a.m., and are confined to those of shade temperature, rainfall, and atmospheric moisture. Originally it was contemplated that observations of max. sun and min. grass temperatures, as well as those of barometric variations, should be taken, but the instruments were broken, and their replacement was a matter of difficulty.

At first the returns were regularly forwarded to Mr. Waterhouse, but on the death of that gentleman no further reductions were made, and although the observations were always carefully registered, on several occasions observations were omitted, hence the existence of breaks in the records. These breaks are:—

In 1876... From 17 to 30 June (incl.), all records.
,, 1877... 28 April, dry and wet bulb therm.
,, ,, ... 12 to 18 June (incl.), all records.
,, 1878... Aug. to Dec. (incl.), minimum shade temp. (therm. broken).
,, 1879... 2 to 7 Nov. (incl.), dry and wet bulb therm.
,, ,, ... 6 and 7 Nov., all records.
,, ,, ... 10 to 13 Nov. (incl.), dry and wet bulb therm.
,, 1880... 13 Feb., all records.
,, ,, ... 14 and 15 Feb., dry and wet bulb therm.
,, ,, ... 10 June, ,, ,, ,,
,, ,, ... 16 and 17 Nov., ,, ,, ,,
,, ,, ... 23 to 27 Dec. (incl.) ,, ,, ,,

On a cattle-station such breaks are almost unavoidable, as it is not possible always to be at home at a stated time daily. Matters have, however, been so arranged now that in future such breaks will not occur.

Since the beginning of the present year max. sun and min. grass temperature observations, as well as wind observations, have been taken.

Barometric observations being only recorded once daily, have not been reduced.

I have, however, now arranged with Mr. C. C. Rawson to gradually increase the number of instruments. One of Mr. Russell's barographs is being specially constructed for "The Hollow" and an anemometer will be erected this year.

At "The Alexandra" (J. Ewen Davidson, Esq.), the Rainfall for the past thirteen years (from 1868 up to date) has been recorded; otherwise only exceptional phenomena have been observed. The mean shade temperature taken at "Alexandra" during 1868 is as follows:—

	Max.	Min.		Max.	Min.
January	95·2	68·7	July	75·5	47·6
February	90·2	68·1	August	77·6	39·5
March	88·0	60·5	September	81·9	47·3
April	86·3	59·0	October	88·0	54·6
May	78·5	54·6	November	88·8	56·8
June	77·3	46·8	December	88·9	63·5

Wherever authentic notes concerning the climate have been obtainable I have made use of them, but I am more particularly indebted to the Messrs. Rawson and Davidson for the long list of figures and facts placed at my disposal.

The Climate of Mackay.

The points in which the Mackay climate differs from the climates of other districts on the coast are due, beyond the actual situation of the district in latitude and longitude, to the peculiar position the coast range of hills occupies.

From Cape Palmerston the coast range takes an almost due westerly direction until at about 35 miles from the coast it changes its course and runs to the north, diverging slightly to the west, and approaching the coast again at Mount Dryander, near Cape Conway. That part of the district lying to the south of the Pioneer River, and between the coast and the range, consists of a large and slightly undulating lightly timbered plain. On the north side of the river the country is more undulating and much broken by isolated mounts and spurs, between which again there are small plains; originally the greater part of this portion of the country was heavily timbered.

The country, whilst thus exposed fully from the N.E. to the S.E., is sheltered to a great extent on the S., W. and N. by the

range and isolated mounts, and accordingly as easterly or westerly winds prevail so does the temperature rise and fall. Often when the rains are heavy on the coast below the range, over the range there is no fall at all; and whilst the country over the range is fully exposed to the westerly winds, Mackay only feels them when they blow strongly (chiefly at night); again, the broken nature of the country on the north side of the river causes a wide difference in the annual amount of the rainfalls there (Tables X and XI).

At the present moment there are eight rain-gauges in the district, as follows: at Homebush, the Alexandra, the Hollow, Nebo Telegraph Station, St. Helen's (started this year), Bloomsbury Telegraph Station, the Cedars, and at the Telegraph Station in town.

The Alexandra rain-gauge gives probably the fairest idea of the mean annual rainfall, that gauge being situated almost in the middle of the district, and having registered daily since 1868. The rainy season usually commences about the end of December, and continues, with alternate two or three weeks dry and wet, until April, and occasionally into May. In June and July there is usually a small amount of rain; the fall in the latter month last year (1880) was exceptional, being 8·55 in. at the Alexandra and 8·26 inches at the Hollow, and over 10 inches in town, at the Cedars, and Homebush. August is least supplied with rain; in September there is a slight increase, and this increase continues in October, when thunderstorms set in, until December brings the rainy season on again. During the last three years the rainy season has been a month or more late. The greatest rainfall recorded in twenty-four hours at any of the rain-gauges was in town, on 10th March, 1878, when 16·81 inches fell; at the same time 15·85 inches fell at the Cedars and 14·07 at the Alexandra.

In December, 1874, there occurred at Foulden Plantation (about 4 miles from town on the north side of the river) an extraordinary local fall of rain, 15 inches falling in twenty-four hours:—

On December 4, at 9 a.m., 0·70 inches were recorded.
„ „ 4, at 6 p.m., 9·50 „ „ „ } 15 inches in twenty-
„ „ 5, at 9 a.m., 5·50 „ „ „ } four hours.
„ „ 6, at 9 a.m., 0·70 „ „ „

At Alexandra, at the same time, the fall was as follows:—

On December 4, at 8 a.m., 2·70 inches were recorded.
„ „ 5, at 8 a.m., 6·83 „ „ „
„ „ 6, at 8 a.m., 0·22 „ „ „

During this time it rained throughout the district, but only locally heavily at Foulden, where at the back the creek was as swollen as in flood-times, although the river only rose slightly (Rainfall tables I, VII, IX, X, XI).

There have been five hurricanes recorded in Northern Queensland since 1860:—

Jan. 20, 1860.
Feb. 9, 1864.
Mar. 2, 1867, at Townsville (see Messrs. Rawson's notes).
Jan. 22, 1874, at Broadsound ,, ,, ,, ,,
Feb. 22, 1875, at Bowen ,, ,, ,, ,,

The floods in the river, on record, are those of 1864, 1867, 1874, and 1875, synchronous with the hurricanes and heavy rainfalls. In March, 1876, the river rose up to within 4 feet of the 1875 flood-marks. The ooze deposited by the floods is great; after the flood of March, 1881, this year, I measured cakes of ooze varying from $\frac{3}{4}$ to $1\frac{7}{8}$ in. in thickness.

In July, 1880, there was a storm, the records of which taken at the Alexandra are as follows:—

July 11.	Velocity of wind in 24 hours,	56	miles;	rainfall	1·26	inches.
,, 12.	,, ,, ,,	54·3	,,	,,	3·73	,,
,, 13.	,, ,, ,,	30	,,	,,	1·14	,,

The climate is very humid; the Hollow observations, reduced, give the humidity as 83·1 (that of Sydney 1859–1875 is 73·1). The humidity depends largely on the winds as well as naturally on the rains; it rises gradually from January to June, falls rather more rapidly, attaining its mean lowest point in November, then rises slightly in December and rapidly in January. When the atmosphere is highly saturated, books, clothes, furniture, &c., are covered with mildew, and the greatest care is requisite to prevent their destruction; lightly bound books must at such times be carefully handled, otherwise their backs come off; in dry weather, on the contrary, book-covers will curl up. Extreme dry atmosphere is exceptional, seldom lasting above a few days, but extremely saturated atmosphere lasts for three weeks or more occasionally.

The mean shade temperature for the four years 1876, 1877, 1879, and 1880, reduced from the maximum and minimum daily observations at the Hollow, is 73·1° F.; that of Sydney, 1856 to 1875, is 62·5. The mean minimum is 62·7, and the mean maximum for five years is 81·6. The mean temperature for April (four years) being 73·4, is the nearest approach to the annual mean. Previous to 1876 the only temperature observations on record are those of the year 1868, taken by Mr. Davidson at the Alexandra.

December is the hottest month, the mean temperature decreasing slowly until March, when the decrease is at the rate of four degrees per month, until the lowest mean (60·6) is reached in July, when the rise is at the rate of five degrees per month until the mean of October is attained; the rise is rapid in November, whose mean is only 1·2 degrees less than that of December.

Light frosts are occasionally felt, but no systematic observations with grass thermometer have been made at the Hollow. At the Alexandra, however, the days on which the minimum thermometer on grass registered freezing-point, or under, are as follow :—

1872.	July 29...........	31°
	,, 30...........	29°
	,, 31...........	30°
	Aug. 1...........	28°
	,, 2...........	30°
	,, 3...........	30°
1873.	July 15...........	32°
1874.	No frosts.	
1875.	June 27...........	30°
	July 6......... ..	29°
1875.	July 29...........	29°
1876.	,, 22...........	29°
	,, 23.	28°
	,, 29...........	28°
1877.	,, 29...........	32°
	,, 30...........	30°
1878.	June 11...........	31°
1879.	July 11...........	32°
1880.	June 22...........	32°

The mean diurnal range, as reduced from observations taken at the Hollow, is tolerably great for the locality; it is 21·8 degrees; it is greatest in September; during August, October, and November it is also great. In March the mean diurnal range amounts to 14·5 degrees only; the range throughout that month fluctuates very little, and it is in that month that the heaviest rainfalls are annually recorded. There appears to be, throughout, a certain connection between diurnal range of temperature and moisture (and rainfall); with further observations this may show itself more definitely.

The extreme range of temperature recorded at the Hollow, from 114·5° in the shade on 31st December, 1877, to 35° in the shade on 11th June, 1878, is 79·5°

It is much to be regretted that the winds have not been recorded, as so very much depends on them.

The climate is healthy; the less healthy periods are towards the end of the year, before the wet weather sets in, and during and after the wet seasons. From August to the middle of November the climate is genial.

CONDENSED notes on the climate previous to 1876 (when the continuous meteorological observations were instituted), extracted from the diaries of Messrs. C. and E. Rawson :—

1866.	Dec.	7 to 26 incl...	Rain more or less daily. On 23rd the river rose.
1867.	Jan.	3 to 5 ,, ...	The shade thermometer up to 110° daily.
	,,	12	Heavy dew.
	,,	20	Hurricane.
	,,	21	Rain and thunderstorm.
	Feb.	4	Two thunderstorms.
	,,	8	Rain.

1867.	Feb.	23	Raining heavily.
	,,	24	Rain.
	Mar.	2 to 6 incl. ...	Raining heavily. On 4th flood in river
	,,	11	Rain.
	,,	12 and 13	River going down, but still high.
	,,	21	Rain.
	,,	28 to 31 incl...	,,
	April	1 to 6 ,, ...	Rain more or less daily. River very high on 2nd and 5th.
	,,	8 to 12 ,, ...	,, more or less daily.
	,,	21 to 24 ,, ...	,, ,, ,, ,,
	May	9	Drizzle all day.
	,,	13	Slight rain.
	,,	15 to 18 incl...	Rain.
	,,	27 and 28	,,
	June	12 and 13	,,
	,,	18 and 19	,,
	,,	20 to Sept. 16.	No records.
	Sept.	17	Rain.
	,,	24	Heavy rain. River rose 15 feet by 12 o'clock.
	Oct.	12	All hands on sick list with fever.
	Dec.	4	Thunderstorm.
	,,	5, 1867, to 31 Jan., 1871, no records.	
1871.	Feb.	1	Rain.
	,,	25 to 27 incl...	,,
	Mar.	5 and 6	,,
	,,	10	,,
	,,	14	Three showers.
	April	1	Rain.
	,,	19	Too wet to brand.
	May	23	Rain.
	Aug.	4	,,
	,,	17	,,
	Sept.	20	,, off and on.
	,,	21	,, hard.
	Oct.	4 to 6 incl...	,, ,,
	,,	18	,,
	,,	22 to 23 incl...	,, hard.
	,,	28	Wet.
	Nov.	3	Heavy thunderstorm
	,,	18	Rain hard.
	,,	19 to Dec. 11..	No records.
	Dec.	12	Eclipse of sun.
	,,	27 to 31 incl...	Rain more or less daily.
1872.	Jan.	4 to 18 ,, ...	,, ,, ,, ,,
	,,	20	,,
	,,	22 to Feb. 1 incl.	,, ,, ,, ,, On 23rd January thermometer 95° in the shade during rain
	Feb.	5	Thermometer 102° in shade.
	,,	12 to 16 incl...	Rain. On 14th river rose very high
	,,	24 to 28 ,, ...	,,
	Mar.	4	,,
	,,	7 to 9 incl. ...	,,
	May	21	,, heavily—it was much needed
	Sept.	3 and 4	,,
	Nov.	10	Heavy thunderstorm.
	,,	11 and 12	Rain, heavy.

1872.	Nov.	13	Rain, heavy, and thunderstorm.
	,,	14 and 15	,,
	,,	19 to Dec. 5 inc.	,, more or less daily.
	Dec.	27 to	
1873.	Jan.	18 incl.	,, for twenty-three days continuously. River up on 13th January, and very high on 16th January.
	Jan.	21 to 31 incl...	,, occasionally very hard.
	Feb.	1	Showery.
	,,	3 and 4	Rain.
	,,	6	Showery.
	,,	13 to 17 incl...	Rain more or less daily.
	,,	19 to 22 ,, ...	,, ,, ,, ,,
	,,	24 to 26 ,, ...	,, ,, ,, ,,
	,,	28	,, hard.
	Mar.	1 to 3 incl. ...	,,
	,,	9 and 10......	,,
	,,	13 to 20 incl...	,,
	April	3 to 7	,,
	,,	26 to 27	,,
	May	14 to 17 incl...	,,
	,,	19	,,
	,,	23 to 26 incl...	,,
	,,	29 and 30	,,
	June	2 to 4	,,
	,,	9 to 13 incl...	,, River up on 13th.
	,,	16 and 17	,,
	,,	25	,,
	,,	27	,,
	,,	30	,,
	July	5	,,
	,,	19	,,
	,,	30 and 31	,,
	Aug.	1	Showery.
	,,	2	Rain.
	,,	21	,, hard.
	Oct.	15	Light showers.
	Nov.	2 to 4 incl. ...	Rain.
	,,	24	Heavy thunderstorm at night.
	,,	25	,, ,, at 4 p.m.
	,,	26	,, ,, at night.
	,,	27	,, ,,
	,,	28	Thunderstorm.
	,,	29	,,
	,,	30	,, in afternoon.
	Dec.	1	Heavy thunderstorm as usual at 4 p.m.
	,,	2	Thunderstorm at 8 p.m.
	,,	3	Usual thunderstorm.
	,,	5	Thunderstorm in evening.
	,,	6	,, again.
	,,	7	Slight rain.
	,,	22 and 23	Rain.
	,,	30	,,
1874.	Jan.	1 to 4 incl. ...	,,
	,,	8 to 17 ,, ...	,, river pretty high on 15th
	,,	22 to 25 ,, ...	,, hard on 25th.
	,,	31	Very heavy storm.
	Feb.	2 and 3	Rain.

1874.	Feb.	10 to 13 incl...	Rain.
	,,	21	,,
	,,	23	,,
	Mar.	3 to 5 incl...	,,
	,,	23 to 25 ,, ...	,,
	,,	28 to 31 ,, ...	,,
	April	8 to 12 ,, ...	,,
	,,	18 to 20 ,, ...	,,
	May	10 and 11	,, heavily.
	,,	26	,, very hard.
	June	3	,,
	,,	5 to 8 incl...	,,
	,,	12 to 14 ,, ...	,,
	,,	20	,, heavily at 5 a.m.
	,,	23	,,
	July	3 and 4	Rain hard.
	,,	19 and 20	,,
	,,	22	Showers.
	,,	28 to 30 incl...	Rain hard.
	Sept.	26	,, ,,
	Oct.	8	,,
	,,	18 to 21 incl...	,,
	,,	26 and 27	,,
	Dec.	2 to 8 incl ...	,, hard daily; thunderstorm on 7th.
	,,	10 to 17 ,, ...	,, ,, ,,
1875.	Jan.	19	Rain steadily all day.
	,,	20	,, hard; river up 25 feet.
	,,	28 to 31 incl...	,, more or less; on 31st river pretty high.
	Feb.	1 and 2	,, hard.
	,,	4	,, ,,
	,,	13 to 16 incl...	,, ,, river very high indeed.
	,,	20 and 21	,,
	,,	22	Very high wind and rain.
	,,	23	Blowing a gale, with rain; river very high.
	,,	24	Weather broke for a couple of hours; rain harder than ever.
	,,	25	Rain heavily; river higher than ever seen; s.s. "Tinonee" seven days coming from Bowen to Mackay, usually a fifteen hours' passage.
	Mar.	1 to 6 incl. ...	Rain heavily.
	,,	7	Showers.
	,,	10	Rain.
	,,	11 to May 18..	No records.
	May	19	Rain.
	,,	26 to 27 incl...	,, hard.
	June	1	,,
	,,	4	,,
	,,	5	,, hard.
	,,	15	,, ,,
	,,	23	,,
	July	1	Heavy thunderstorm.
	,,	2	Rain.
	,,	8	,,
	,,	11	,,
	,,	13	,,
	Sept.	25	,,
	Nov.	3	Thunderstorm at night, but very little rain.
		8	Heavy rain.

1875. Nov 11 .... *Earthquake.* Shocks were felt and heard in town and on the banks of the river. At "The Hermitage," on the river bank, about 2 miles from the wharves in town, two distinct shocks were felt, the second immediately succeeding the first. At Branscombe, 8 miles from "The Hermitage," and 3 from Alexandra, the direction of the earthquake was observed to be from N. to S. across the river. One shock continuous was felt and heard at "The Hollow," but at the "Nyth," about 400 yards further up and on the same (south) side, nothing was noticed, whilst at "Hamilton" Station, about 1¼ mile beyond "The Hollow," the shocks were distinctly noticed. Mr. Harry Black, the Manager of the Station, gives the time of the occurrence as about 2 minutes to 9 p.m. (H.L.R.)

,, 30 .... Rain.

Dec. 2 and 3 ...... ,,

,, 21 .... ,, hard.

,, 25 .... ,,

,, 30 .... Heavy shower at 4 p.m.

TABLE I.

RAINFALL.—Receiving surface of Rain-gauge 8 inches, at a height of 3 ft. 1 in. from the ground, and about 200 feet above sea-level.

Month.	1876.		1877.		1878.		1879.		1880.		Average.
	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.
Jan....	8·34	16	8·85	19	5·63	16	10·88	22	11·63	21	9·066
Feb....	8·92	12	9·90	22	9·18	14	7·89	12	25·96	20	12·370
Mar ...	23·36	14	19·88	30	34·70	30	18·03	27	4·04	13	20·002
April..	2·20	9	3·12	19	0·98	8	10·99	19	10·97	21	5·652
May...	11·56	18	0·05	5	3·02	11	1·85	6	0·99	10	3·494
June ..	4·05	13	2·77	11	5·35	4	2·05	6	1·71	4	3·186
July...	2·30	7	0·67	8	0·66	6	1·41	5	8·26	14	2·660
Aug ...	0·29	7	0·21	3	0·09	2	4·16	9	0·04	1	0·958
Sept...	0·67	6	2·70	10	1·76	10	1·67	5	0·20	3	1·400
Oct. ...	2·74	8	0·01	1	4·32	4	3·76	12	1·07	6	2·380
Nov ...	2·22	8	1·53	4	3·57	7	0·15	1	1·64	9	1·822
Dec....	3·58	9	3·62	9	10·72	15	1·22	4	6·60	11	5·148
Totals	70·23	127	53·31	141	79·98	127	64·06	128	73·11	133	68·138

Annual average rainfall, 68·138 inches.
,, ,, number of rainy days, 130.
Average fall on each rainy day, 0·519 inches.
Greatest average monthly fall of rain was in March, 20·002 inches.
Least ,, ,, ,, ,, ,, August, 0·958 ,,
Greatest monthly fall of rain was 34·70 inches, in March, 1878.
Least ,, ,, ,, ,, 0·01 ,, October, 1877.

Heavy falls in twenty-four hours :—
8·00 inches on 22 March, 1876.
3·95 „ „ 23 „ „
4·30 „ „ 24 „ „
5·50 „ „ 6 May „
4·00 „ „ 21 February, 1877.
8·98 „ „ 10 March, 1878.
6·64 „ „ 9 „ „
4·74 „ „ 3 „ „
4·17 „ „ 10 October, 1878.
3·50 „ „ 9 March, 1879.
4·03 „ „ 23 January, 1880.
5·63 „ „ 5 February, „
5·35 „ „ 6 „ „
5·81 „ „ 18 „ „

In September, October, November, and partly December, rains are almost always due to thunderstorms from the south-west, which finish in the south-east.

The rainy season rains, from December to April, and even into May, are brought up from the east, chiefly the south-east.

Northerly and westerly rains are exceedingly rare.

The rainfall in July, 1880, was exceptional—it came up from the south-east.

TABLE II.

Degree of Humidity (Absolute Saturation—100).

Observations taken at 8 a.m. daily from dry and wet bulb thermometers, the reductions being made by means of Glaisher's Tables.

Month.	1876.	1877.	1878.	1879.	1880.	Means.
January	82·9	81·5	77·1	81·0	83·4	81·2
February	82·4	83·1	82·0	81·1	85·0	82·7
March	88·0	88·5	90·2	88·0	79·6	86·9
April	86·6	88·0	89·6	88·2	89·9	89·8
May	89·8	89·1	91·9	88·8	89·8	89·9
June	89·4(?)	93·5(?)	93·2	88·4	90·0	90·9
July	83·9	91·6	88·7	89·4	90·0	86·4
August	89·7	87·4	89·4	88·9	88·7	88·8
September	78·9	83·7	86·3	79·8	77·0	81·2
October	70·9	75·7	73·4	80·6	74·6	75·0
November	71·3	79·7	69·6	70·7	67·5	71·8
December	71·6	76·2	78·5	64·6	77·1	73·0
Means	82·2	84·8	84·2	82·5	82·7	83·1

The relative average humidity at 8 a.m. is therefore 83·1.

The month in which there is least humidity is November, the average being 71·8.

The month in which there is most humidity is June, the average being 90·9(?)

The year 1877 was the most humid, although in that year there was the least rainfall. That rainfall was, however, spread over 141 days, or over fourteen days more than in 1878, the year next highest in point of humidity. In 1877 on twelve days only did the humidity fall below ⅔ of saturation, and the minimum it descended to was 55.

The moisture in May, June, July, and August, is largely due to fogs and heavy dews; the dryness in September, October, November, and December,

to westerly winds and occasional dry northerly winds (on this point, however, continuous observations have not been made). In November, 1878, owing to westerly wind, the humidity fell on the 7th to 40, and again from same cause to 40 on 27th November, 1879. On 28th September, 1880, it fell to 36, the lowest on record.

Saturation was reached four times in March, 1876; once in February, March, and October, and twice in December, 1877; thrice in March, eight times in June, and once in September, 1878; once in January and August, 1879; once in February and May, 1880.

Humidity fell below ⅔ of saturation 30 times in 1876.
" " " 12 " " 1877.
" " " 26 " " 1878.
" " " 36 " " 1879.
" " " 25 " " 1880.

TABLE III.

MEAN MINIMUM SHADE TEMPERATURE (self-registering thermometer).

Month.	1876.	1877.	1878.	1879.	1880.
January	72·9	71·9	71·6	70·8	72·3
February	70·2	69·9	72·4	70·5	73·4
March	70·4	69·7	71·5	71·1	71·3
April	63·1	62·9	64·4	65·9	68·8
May	62·6	55·9	59·2	52·9	56·7
June	56·6(?)	53·9(?)	49·7	50·8	50·1
July	48·9	47·9	49·6	49·8	50·1
August	52·6	47·1	......	55·9	50·9
September	54·7	56·5	......	58·2	55·9
October	58·6	59·6	......	64·0	62·9
November	65·3	68·4	......	67·6	70·5
December	68·3	71·0	......	72·6	70·3
Year	62·0	61·2	......	62·5	62·7

TABLE IV.

MEAN MAXIMUM SHADE TEMPERATURE (self-registering thermometer).

Month.	1876.	1877.	1878.	1879.	1880.
January	90·4	90·6	93·1	90·7	84·7
February	85·3	87·5	96·2	92·4	84·3
March	85·1	84·4	86·2	85·2	85·9
April	81·2	83·5	87·1	80·5	81·1
May	76·9	83·9	80·4	77·9	76·8
June	72·9(?)	75·8(?)	75·1	72·3	72·3
July	69·1	75·9	78·5	73·8	69·6
August	75·3	81·9	81·0	79·1	76·7
September	84·9	84·8	86·9	86·4	81·6
October	94·0	91·8	91·5	81·8	85·7
November	99·8	97·5	94·6	90·2	92·1
December	97·4	98·8	96·6	93·9	88·5
Year	84·4	86·4	87·2	83·6	81·6

TABLE V.

Mean Shade Temperature (reduced from the maximum and minimum daily temperatures) for *four* years.

Month.	1876.	1877.	1879.	1880.	Mean.
January	81·6	81·2	80·7	78·5	80·5
February	77·7	78·7	81·4	78·9	79·2
March	77·7	77·0	77·1	78·6	77·9
April	72·1	73·3	73·2	74·6	73·4
May	70·1	70·0	65·4	66·8	68·0
June	64·7(?)	64·8(?)	61·5	61·2	63·1
July	58·9	61·9	61·8	59·9	60·6
August	63·9	64·5	67·5	63·8	65·0
September	69·9	70·6	72·3	68·9	70·3
October	76·3	75·7	72·9	74·3	74·8
November	82·5	82·9	78·9	81·3	81·4
December	83·2	84·9	83·3	79·4	82·6
Year	73·2	73·8	73·0	72·2	73·1

The mean shade temperature is 73·1 degrees.
The highest mean is reached in December, 82·6 degrees.
The lowest ,, ,, July, 60·6 degrees.

TABLE VI.

Mean Diurnal Range of Temperature in Shade, reduced from the self-registering maximum and minimum thermometers.

Month.	1876.	1877.	1878.	1879.	1880.	Mean 4 yrs. 1876, '77, '79, and '80.
January	17·5	18·6	22·5	19·9	12·5	17·1
February	15·1	17·6	23·9	21·8	10·9	16·3
March	14·8	14·7	14·7	14·2	14·6	14·5
April	18·1	20·6	22·7	14·5	12·3	16·4
May	14·4	27·9	21·2	25·0	16·9	21·1
June	16·2	21·8	25·4	21·5	22·2	20·4
July	20·2	27·9	28·8	23·9	19·6	22·9
August	22·7	34·8	...	23·2	25·8	26·6
September	30·2	28·3	...	28·3	26·0	28·2
October	35·4	32·2	...	17·8	22·8	27·1
November	34·4	29·1	...	22·6	21·6	26·9
December	29·0	27·8	...	21·3	18·2	23·4
Year	22·3	25·2	...	21·2	18·7	21·8

The mean diurnal range for four years is 21·8 degrees.

TABLE VIa.

Mean Diurnal Range, 1880.

January	12·5	Max. 19·0 on 25th	Min. 4·0 on 23rd
February	10·9	,, 20·0 ,, 9th	,, 4·0 ,, 21st
March	14·6	,, 24·0 ,, 29th	,, 6·5 ,, ,,
April	12·3	,, 31·5 ,, 5th	,, 3·0 ,, 14th
May	16·9	,, 30·0 ,, 27th	,, 9·0 ,, 8th
June	22·2	,, 29·5 ,, 17th	,, 7·0 ,, 15th
July	19·6	,, 33·0 ,, 25th	,, 5·5 ,, 13 and 15
August	25·8	,, 37·5 ,, 11th	,, 10·0 ,, 17th
September	26·0	,, 36·5 ,, 19, 24 & 31	,, 14·5 ,, 10th
October............	22·8	,, 38·0 ,, 6th	,, 7·0 ,, 28th
November	21·6	,, 28·0 ,, 2nd	,, 18·0 ,, 29th
December.........	18·2	,, 26·0 ,, 15th	,, 6·5 ,, 20th
Year	18·7	....	....

TABLE VIb.

No. of Days on which Temperature in Shade went up to and over 90°.

Month.	1876.	1877.	1878.	1879.	1880.	Mean.
January...............	21	16	26	16	3	16
February	5	11	25	17	4	12
March	2	5	5	7	4	5
April	...	2	8	...	3	3
May	...	3	1	1	...	1
June	...	...	...	...	...	...
July	...	...	...	...	...	...
August	...	2	...	...	...	...
September............	6	7	13	9	1	7
October	26	20	21	2	6	15
November	30	30	26	18	22	25
December	29	29	27	26	12	25
Year	119	125	152	96	55	109

TABLE VII.

Monthly Extreme Range of Temperature in Shade.

Month.	1876.			1877.			1878.			1879.			1880.		
	Highest Max.	Lowest Min.	Range.	Highest Max.	Lowest Min.	Range.	Highest Max.	Lowest Min.	Range.	Highest Max.	Lowest Min.	Range.	Highest Max.	Lowest Min.	Range.
January..	96·0	68·0	28·0	102·5	68·0	34·5	106·5	66·0	40·5	103·0	67·0	36·0	91·0	69·0	22·0
February	94·5	65·0	29·5	94·0	65·0	29·0	102·0	65·0	37·0	108·0	66·5	41·5	93·0	71·0	22·0
March ...	90·0	65·0	25·0	90·0	65·0	25·0	98·0	62·0	36·0	95·0	67·0	28·0	94·0	69·0	25·0
April ...	89·0	59·0	30·0	90·0	54·0	36·0	95·0	59·0	36·0	89·0	59·0	30·0	95 (?)	59·5	35·5
May	84·0	54·0	30·0	92·0	37·0	55·0	92·0	46·5	45·5	90·0	40·0	50·0	82·0	47·0	35·0
June......	79·0(?)	43·0(?)	36·0(?)	79·5(?)	43·5(?)	36 (?)	83·0	35·0	48·0	80·0	40·0	40·0	78·0	37·0	41·0
July	75·0	38·0	37·0	82·5	37·0	45·5	84·0	41·0	43·0	82·0	36·0	46·0	77·0	39·0	38·0
August...	84·0	41·0	43·0	93·0	40·0	53·0	92·0	...*	...	88·0	44·0	44·0	85·0	39·0	46·0
Sept.......	97·0	40·0	57·0	93·0	44·0	49·0	96·5	...	...	97·0	48·0	49·0	90·5	47·0	43·5
October ..	104·5	40·0	64·5	103·5	51·0	52·5	100·0	...	...	90·0	54·0	36·0	92·0	47·0	45·0
Nov.......	109·0	49·0	60·0	104·0	63·0	41·0	102·0	...	...	96·0	61·0	35·0	98·5	65·0	33·5
Dec.	103·5	64·0	39·5	114·5	66·5	48·0	104·0	...	...	102·0	64·5	37·5	95·0	66·0	29·0
Year...	109·0	38·0	71·0	114·5	37·0	77·5	106·5	...	...	108·0	36·0	72·0	98·5	37·0	60·5

Readings taken from maximum and minimum thermometers, self-registering, in shade.

The greatest monthly range was in October, 1876 ... ... 64·5 degrees.
The least ,, ,, January and February, 1880 22·0 ,,
The highest temperature recorded was on December 31, 1877 ... 114·5 ,,
The lowest ,, ,, ,, June 11, 1878 ... ... 35·0 ,,

On 29th and 30th December, 1877, the temperature of the river water at sundown was 93 and 94 respectively.

* Minimum thermometer broken, and not replaced until December.

TABLE VIII.

RAINFALL at Alexandra Plantation (J. Ewen Davidson, Esq.,) Mackay.

Year.	Jan. In.	Feb. In.	March. In.	April. In.	May. In.	June. In.	July. In.	Aug. In.	Sept. In.	Oct. In.	Nov. In.	Dec. In.	Total Inches.
1868	1·50(?)	20·00(?)	6·12	2·96	11·23	1·41	4·57	0·62	0·10	0·89	1·28	4·72	55·40
1869	5·96	12·27	21·37	8·37	4·53	2·31	0·47	0·81	0·63	0·54	2·03	5·97	65·26
1870	29·63*	21·82*	17·62*	11·68*	2·01	1·94	2·14	2·39	1·70	4·67	6·26	6·14	108·00
1871	28·47	7·10	10·93	1·99	1·90	2·92	......	0·27	2·75	9·12	4·23	10·62	80·30
1872	15·40	12·13	2·07	......	2·95	0·60	0·35	0·75	0·48	0·07	4·47	6·87	46·14
1873	21·53	6·18	8·64	4·44	2·39	5·24	1·38	1·32	0·68	0·19	2·25	14·82	69·06
1874	19·14	6·99	14·42	6·05	5·12	3·58	4·14	......	2·89	4·65	1·50	14·38	82·86
1875	18·33	33·97	1·49	26·70	12·63	1·54	3·75	0·89	0·35	0·05	2·12	3·60	105·42
1876	8·60	6·50	13·42	2·25	8·57	3·74	2·26	0·16	0·15	1·39	1·91	4·06	53·01
1877	9·42	14·01	32·39	4·35	0·06	3·88	0·82	0·13	0·88	0·84	1·66	3·80	72·24
1878	5·95	5·69	42·95	1·00	3·74	5·05	0·27	0·49	2·00	3·14	3·69	11·49	85·46
1879	19·38	8·56	20·25	11·24	1·56	1·68	1·21	3·63	1·71	4·74	0·09	0·83	74·88
1880	12·63	21·71	8·46	14·21	1·16	1·29	8·55	0·10	0·11	1·62	3·87	7·39	81·10
Sums......	195·94	176·93	200·13	95·24	57·85	35·18	29·91	11·56	14·43	31·91	35·36	94·69	979·13
Means 13 years.	15·07	13·61	15·39	7·33	4·45	2·71	2·30	0·89	1·11	2·46	2·72	7·28	75·32

Or 0·48 inch above mean of previous twelve years.

The least amount of rain fell in 1872 ... ... 46·14 inches.
,, greatest ,, ,, ,, 1870 ... ... 108·00 ,,

* Glass gauge broken—only totals recorded.

Diameter of receiving-surface of rain-gauge, 8 inches.

Height of receiving-surface of the gauge above ground, 4 ft. 6 inches.

Approximate height of ground above the level of the sea, 60 feet.

Approximate distance from town, 6 miles, in a due westerly direction.

The greatest fall of rain occurred on the 10th March, 1878, when 14·07 in. fell in twenty-four hours.

The following are some of the heavier falls of rain in twenty-four hours:—

1868.	May	15	4·57	inches.
1870.	Nov.	16	4·11	,,
1871.	Jan.	6	5·48	,,
1872.	,,	12	3·55	,,
,,	Dec.	4	3·82	,,
1873.	Jan.	14	4·74	,
,,	Dec.	24	5·22	,,
1874.	Jan.	22	3·98	,,
,,	Dec.	5	6·83	,,
1875.	Jan.	21	4·11	,,
,,	Feb.	16	4·50	,,
,,	,,	23	6·42	,,
,,	Apl.	18	10·25	,,
,,	,,	19	5·75	,,
,,	May	26	4·70	,,
,,	,,	27	5·00	,,

,, In this year there were fourteen days on which above *three* inches of rain fell, on six of which days above *four* inches fell.

1876.	Jan.	27	4·75	inches.
,,	Mar.	16	3·53	,,
1877.	Feb.	20	4·35	,,
,,	Mar.	14	9·53	,,
,,	,,	24	4·66	,,
1878.	Mar.	9	4·65	,,
,,	,,	10	14·07	,,
,,	,,	29	4·19	,,
,,	Dec.	31	3·32	,,
1879.	Jan.	14	6·73	,,
,,	Feb.	1	3·68	,,
,,	Mar.	9	3·24	,,
,,	,,	10	3·56	,,
1880.	Jan.	23	4·63	,,
,,	Feb.	5	7·02	,,
,,	,,	18	4·20	,,
,,	July	12	3·73	,,

*** For Table IX, see Plan attached.

TABLE X.

RAINFALL, Mackay District, for March, 1878.

Day.	Town.	Alexandra.	Cedars.	Hollow.
1	4·38	2·71	4·88	1·24
2	4·74	3·40	5·42	3·07
3	2·81	2·35	2·17	4·74
4	1·01	1·39	0·95	1·29
5	0·62	0·63	1·18	1·11
6	0·43	0·30	0·52	0·01
7	0·11	0·00	0·00	0·01
8	0·48	0·60	0·94	0·28
9	7·14	4·65	3·93	6·64
10	16·81	14·07	15·85	8·98
11	4·90	2·63	2·87	0·70
12	0·09	0·03	0·00	0·72
13	0·14	0·22	0·00	0·28
14	0·43	0·71	0·63	0·64
15	0·17	0·30	0·52	0·45
16	0·17	0·45	0·58	0·05
17	0·12	0·12	0·06	0·14
18	0·00	0·00	0·00	0·00
19	0·09	0·27	0·00	0·09
20	0·59	0·32	1·39	0·45
21	0·45	0·19	0·32	0·69
22	0·26	0·37	0·16	0·06
23	0·07	0·22	0·42	0·35
24	0·20	0·02	0·19	0·17
25	0·07	0·24	0·06	0·06
26	0·10	0·09	0·00	0·13
27	0·52	0·37	0·00	0·23
28	0·05	0·20	0·00	0·09
29	2·26	4·19	3·45	0·46
30	2·47	1·91	1·13	1·53
31	0·00	0·00	0·05	0·04
Total	51·68	42·95	47·67	34·70
No. of Wet Days	29	28	23	30

TABLE XI.

RAINFALL, Mackay District, for February, 1880.

Day.	Town.	Hollow.	Alexandra.	Cedars.	Home-bush.	Blooms-bury.	Nebo.
1	0·00	0·14	0·13	0·49	0·38	0·11	
2	0·48	0·37	0·43	0·74	0·12	0·47	
3	0·25	0·09	0·14	0·43	0·06	0·15	
4	0·15	0·12	0·15	0·30	3·92	0·32	
5	7·50	5·63	7·02	11·55	5·34	5·80	
6	5·24	5·35	2·70	3·51	0·11	3·72	
7	0·00	0·00	0·00	0·12	0·13	0·00	
8	0·00	0·01	0·00	0·00	0·00	0·00	
9	0·00	0·00	0·00	0·63	0·06	0·00	
10	0·64	0·00	0·00	0·00	0·42	0·00	
11	0·24	0·30	0·00	0·00	0·04	0·52	
12	0·00	0·21	0·00	0·00	0·00	0·13	
13	0·08	0·00	0·00	0·00	0·00	0·09	
14	0·00	0·07	0·15	0·00	0·00	0·00	
15	0·00	0·00	0·00	0·00	0·00	0·00	
16	0·00	0·00	0·10	0·00	1·36	0·00	
17	0·00	0·01	0·12	0·00	4·08	0·00	
18	6·38	5·81	4·20	6·27	2·11	0·87	
19	2·29	1·67	1·75	2·12	1·21	2·38	
20	1·25	2·14	2·15	1·87	2·90	5·30	
21	1·80	2·18	2·12	2·20	2·12	2·90	
22	0·87	0·91	0·15	0·78	0·73	0·11	
23	0·80	0·59	0·00	1·00	0·18	0·16	
24	0·04	0·28	0·12	0·00	0·11	0·13	
25	0·05	0·07	0·00	0·28	0·00	0·15	
26	0·00	0·01	0·11	0·18	0·00	0·00	
27	0·00	0·00	0·17	0·00	0·00	0·00	
28	0·00	0·00	0·00	0·00	0·00	0·00	
29	0·00	0·00	0·00	0·00	0·00	0·00	
Total......	28·06	25·96	21·71	32·47	25·32	23·31	3·95
No. of Days.	16	20	17	16	18	17	?

RAINFALL, Mackay District, for the year 1880.

Month.	Town.	Hollow.	Alexandra.	Cedars.	Homo-bush.	Blooms-bury.	Nebo.
January..	10·20	11·63	12·63	8·68	15·33	9·38	4·82
February.	28·06	25·96	21·71	32·47	25·32	23·31	3·95
March ...	5·04	4·04	8·46	5·52	6·31	1·52	0·00
April......	19·29	10·97	14·21	14·61	14·62	9·75	4·05
May	1·79	0·99	1·16	1·44	1·64	0·00	0·13
June	1·14	1·71	1·29	2·20	3·57	0·50	0·86
July	10·08	8·26	8·55	10·06	10·57	6·50	12·57
August ...	0·00	0·04	0·10	0·15	0·00	0·00	0·00
Sept.	0·38	0·20	0·11	0·37	0·83	0·00	0·00
October...	3·05	1·07	1·62	2·67	1·03	1·33	0·98
Nov.	6·67	1·64	3·87	4·50	1·91	1·28	9·67
Dec.	10·61	6·60	7·39	10·37	6·94	6·25	1·73
Total Inches.	96·31	73·11	81·10	93·04	88·07	59·82	38·76

Town rain-gauge at Telegraph Office, 8 ft. 4 in. above ground, with 8 in. receiving surface; about 3 miles from tho coast.

The "Cedars" rain-gauge (M. Hume Black, Esq., M.L.A.), 18 inches above ground, with 8 in. receiving surface, situated about 5 miles from the town in a N.W. direction and about 250 ft. (?) above the level of the sea.

The "Homebush" rain-gauge (F. H. Myddleton, Esq.), 3 ft. 6 inches above ground, with 8 in. receiving surface, situated about 12½ miles from town in a S.W. direction, and about 120 ft. above the level of the sea.

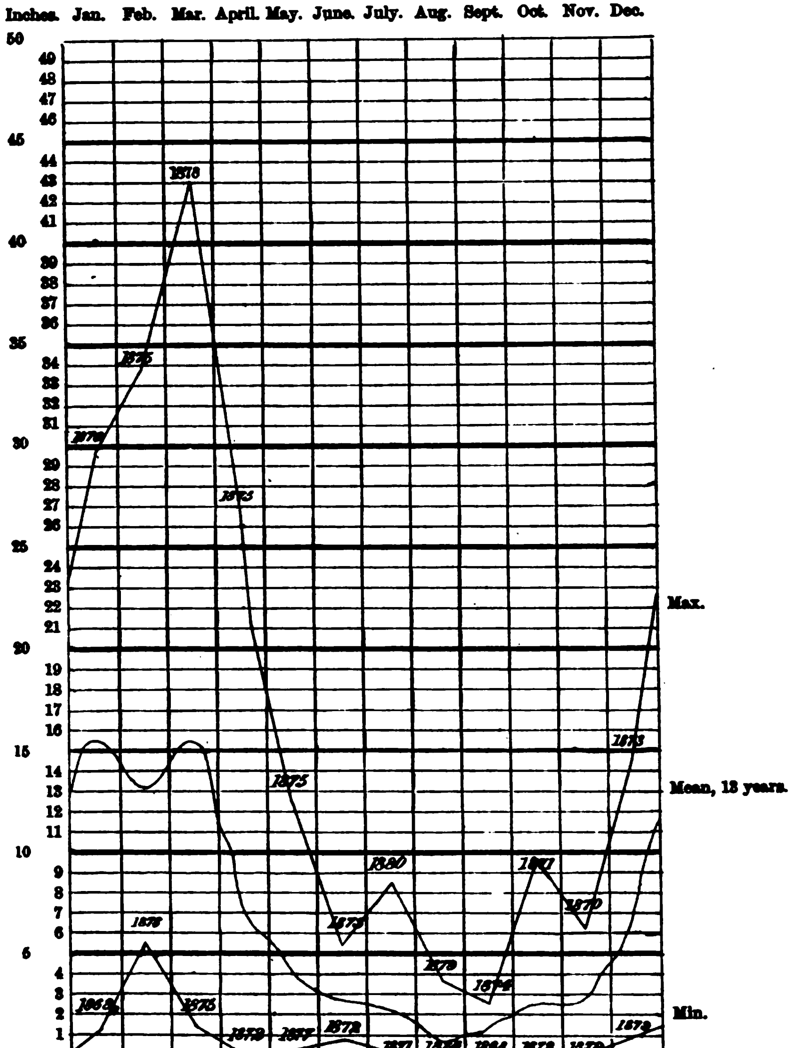
The "Bloomsbury" rain-gauge (Tel. St.) is situated about 65 miles to the north of Mackay, within about 6 miles of the coast, at a tolerable elevation.

The "Nebo" rain-gauge is situated about 75 miles from Mackay across the range in a south-westerly direction, and therefore at a considerable elevation.

[Plan.]

TABLE IX.

CURVES of the Rainfall at Alexandra Plantation (J. Ewen Davidson, Esq.), Mackay.



This curves-table shows at a glance the variability in the monthly distribution of the rainfall. The greatest fall of rain in any one month occurred in March, 1878, when 42·95 inches of rain fell. The least fall of rain in any one month occurred in October, 1875, when only 0·05 inches were registered. Only three months are on record during thirteen years in which no rain at all fell; these are April, 1872, July, 1871, and August, 1874.

LITHOGRAPHED AT THE GOVT. PRINTING OFFICE
SYDNEY. NEW SOUTH WALES.

5a 14–81 (b)

Notes of a Journey on the Darling.

By W. E. Abbott, Wingen, N.S.W.

[*Read before the Royal Society of N.S.W., 1 June, 1881.*]

In June of last year I was offered by the Government the work of appraising for rent some of the runs in the interior of the Colony, and wishing to see as much as possible of the Darling watershed, and to satisfy myself as to some of the problems awaiting solution there, I accepted the offer. In the course of my travels I met with some things that seemed difficult or almost impossible of explanation, and in these cases I have not hesitated to put forward the theory that seems to me to account for most of the facts—not because I am firmly convinced of the absolute truth of the theory, but because I think any theory which contains a germ of truth is a step towards solving the difficulty, and will at any rate induce people who are in a position to do so to observe and think.

There is a kind of satisfaction in upsetting a theory which has been formally stated that will induce many men to take an amount of trouble and exercise a patient thoughtfulness that the pure love of science would never do.

Starting from Murrurundi, I followed the watershed of the Namoi River down as far as Walgett, where that river joins the Darling, or Barwon, as it is there called.

The country from Murrurundi to Walgett is perhaps as rich as any part of the Colony, or even of Australia, consisting of open plains and low timber, there being a noticeable scarcity of what might be called, in the ordinary sense, forest country.

The trees are of a tolerable size for about 100 miles west of the Liverpool Range, and after that all the timber seems dwarfed. What is called forest land in Australia gets its name on the *lucus a non lucendo* principle, because there is an absence of anything in the shape of genuine forest timber. The massive trees running up some hundreds of feet and shutting out the light of day with their leaves and branches are altogether wanting in what the auctioneers describe as "open forest country," and instead we have stunted trees from 20 to 40 feet high, thinly scattered over the face of the country. There are some places between the Liverpool Range and the Darling where timber of value is found, chiefly pine and some ironbark, and along the banks of the rivers there is a narrow fringe of good-sized gum trees, but though the country is by no

means timberless in the sense of having no timber at all of any kind, the absence of large trees is a noticeable feature in the scenery.

The traveller going westward from the main range on any of the rivers, from the Gwydir in the north, to the Lachlan in the south, will notice as he goes a gradual stunting of the timber and also the gradual disappearance of many of the trees most common in the vicinity of the Great Dividing Range until, before reaching the Darling, he will find that, with the exception of the red gum, all the trees so familiar to the dwellers on the East Coast and on the western slopes of the Range have disappeared, and been replaced by a low, stunted growth of timber, and the gums, instead of being scattered over the face of the country, are confined, with a few exceptions, to the land within 100 yards of the river banks. After travelling over a very large extent of the country, at different times, from the Queensland border in the north to the Lachlan River in the south, on both sides of the Darling, and also on the Moonie, Narran, Bokira, Culgoa, Warrego, Bogan, Macquarie, Namoi, and Castlereagh Rivers, I am inclined to think that not more than one-fiftieth of the Colony west of the Main Range is timberless country, or quite clear of trees.

The number of trees per acre on timbered land in the interior is about the same, on an average, as in the old settled districts, but the great difference is in the size of the trees.

After crossing the Darling on the western side, except along the water's edge, I saw nothing deserving the name of a tree. The coolabar, a kind of box, which grows only on flooded land, and the river gums, which grow only within about 100 yards of the water, are the only trees of any size to be found, and they are very poor specimens of timber trees. Pine trees, I believe, are found on some of the sand-ridges from 1 foot to 18 inches in diameter, but they must be very scarce, as I came across but few of them in my journey. The greater part of the remainder of the country is covered with trees or shrubs of various kinds, seldom rising to more than 20 or 30 feet in height. And this brings me to the first of the difficulties which I would like to see explained.

Why, if the rainfall is sufficient to maintain the growth of trees 20 or 30 feet high, do not the larger kinds of timber trees grow here?

The soil we know is rich almost beyond belief, and the rainfall in many places not less than in some places nearer the coast where large trees are found. It seems logical to suppose that if there is sufficient moisture permanently to support a tree 30 feet high the larger trees would have a still better chance by rooting deeper. Can it be that the mineral constituents of the soil at a short distance from the surface are such as to prevent deep-rooting trees from growing in it?

Supposing the soil to contain a large quantity of salt, which, to judge by the salt nature of the vegetation and the number of salt wells, seems very probable, would not the effect of the rainfall be to wash the salt out of the surface soil and carry it down to the subsoil, and then the surface-rooting plants might flourish and deep-rooting plants which could not bear a salt soil would perish? Of course in sandy country, where the water could percolate freely, the salt would be carried to a greater depth than in clay soils, and so we find the salt-bushes almost without exception growing on clay soils that are not subject to inundation. This would account for the fact of the rivers having a fringe of gum and coolabar trees along the banks, where the water frequently rising and retiring again within the banks would soon wash out all the salt that may have been in the soil originally, and also for the existence of pine forests in the sandy country or on the sand ridges as they are called, although in many cases there seems to be no ridge but only a change from clay to sand, and in the only place in which I saw a section of the strata the clay was overlying the sand.

After leaving Walgett I went up the Darling (or Barwon) to the Queensland boundary, and noticed that in all the country on the lower Namoi, and all up the Barwon to Queensland, there is a remarkable absence of stones or rocks of any kind. There is a kind of rock showing in the Barwon River in one or two places, more particularly at Bundinbarrina Falls, but the appearance is rather that of burnt clay than of what one might call a genuine rock. I brought a specimen from Bundinbarrina Falls, and afterwards, on examining the Fishery as it is called at Brewarrina, which is about 160 miles lower down the Darling, I saw that the rock which there forms a bar across the river is very similar to that at Bundinbarrina, and the fall caused in the river is almost exactly the same in both places, the river descending not in a single fall but in a series of rapids by which in about 100 yards it falls 6 feet.

The most remarkable thing which I noticed in the northern part of the Darling watershed was the wide distribution of a conglomerate composed chiefly of waterworn quartz pebbles, called on the Barwon and Narran murrillo, but not known by this name in other parts of the country where the conglomerate is found. On making inquiries among the blacks I found that in their language murrillo means ant-hill—that is, the red cone-shaped ant-hill that is found in all the northern and western parts of New South Wales. These ant-hills are nearly always built on the highest ground in that part of the Colony, to avoid floods, and as the highest ground is generally that which is composed of the quartz conglomerate it is easy to understand how the word which first meant ant-hill came also to mean the ridges on which the ant-hills

are found. These murrillo ridges are not by any means numerous, as all the country is very level and free from rocks or stones, but wherever there is a ridge, or at least wherever I had an opportunity of examining one, from the Queensland border on the Darling and as far west as the Warrego, and southward nearly to Bourke, and up the Bogan nearly to Nyngan, I always found it composed of the same conglomerate—that is the same in appearance. In looking at these murrillo ridges and seeing the ground strewn with white waterworn pebbles, looking almost as if there had been a fall of snow, I often wondered what could have been the geological character of the country from which this conglomerate originally came. The perfectly rounded pebbles of which it is composed prove beyond question that the materials must have been rolled about in water for a long time before finding a resting place and become consolidated into what we now see forming the bed rock in so large a part of the northern and western parts of the Colony. There is no high land in any part of the Colony now from which the materials forming this conglomerate could have been carried down into the plain, and the only place in which I have seen the same sort of stones in large quantities as are found in the murrillo conglomerate is in the neighbourhood of Cobar, and here its various constituents are found *in situ* without any appearance of having been subject to the action of water in motion.

About 50 miles east of Cobar, over a large extent of country, and also in other places round Cobar, I saw ridges composed almost altogether of white quartz, and here the fragments were all angular, and all the other rocks as far as I could judge that go to make up the murrillo conglomerate are here found in the same state—that is without any appearance of having been waterworn. This Cobar country is elevated somewhat above the interior plain, but being covered in most places with a bed of red clay it is impossible without a long and careful examination to form any opinion as to the general formation. I saw granite both to the north and south of Cobar, and many kinds of volcanic with few sedimentary rocks. There is a rather remarkable place where the murrillo conglomerate is exposed at Grawin Water between the Narran and the Darling, about 15 miles from the Narran River and 20 miles north-east of Narran Lake.

Riding along in a slightly undulating country interspersed with rich plains one comes suddenly on what seems to be a fine river, with steep rocky banks about 20 feet high, and a body of water between of about 50 yards in width. The river seems to be flowing from a point a little north of east in a westerly direction, but on following it half a mile to the east one is not a little surprised to find it ending suddenly in a large plain; and on going in the opposite direction the same thing happens in a short distance. This magnificent river begins and ends in about a mile.

That the current, when it does run, is from east to west there can be no doubt, from the drift of stones which has been carried out on to the western plain; but the thing which strikes one at first as difficult of explanation is how in a country so level, where one would think there could not possibly be any head of water, a channel could have been cut through almost solid rock more than 60 yards in width and 20 or 25 feet deep.

On examining the country round and making inquiries, I found that there was a very large area of country (of which Cawarra Plain is the lowest part) surrounded by ridges, and only open to the north towards the Narran River, and it seems probable that this used in times of flood to be filled from the Narran, and that the point in which Grawin Water is now found was the lowest place where the water broke over the ridge and escaped from the lake which must have covered those plains at that time. Of course if this theory is correct it is easy to understand how the water, after rising to the top of the ridge, with a fall of about 20 feet in about half a mile, would have force to cut a channel for itself and ultimately to empty the lake. It is impossible to be quite sure without getting the relative levels of the Narran and Cawarra Plain, but I am confirmed in the truth of this explanation by information I received from Mr. J. K. Doyle, of Tamworth, who was there in 1864, and describes Cawarra Plain as, at that time, an immense lake, with waves at least 5 feet high and a perfect torrent flowing through the Grawin water-course. It was impossible, in the then flooded state of the country, to find out where the water came from, but the probability is that it was the overflow of the Narran.

The murrillo conglomerate shows in the banks of the Grawin, and is lying on a white rather soft rock, almost as light as meerschaum, of which I brought specimens with me. In some places this underlying rock is so soft as to be easily cut with a knife, and in others as hard as flint.*

* Within the last few days I have been informed by Mr. Bagot, of Gundabline, who has been resident on the Moonie River, near the Queensland boundary, for about thirty years, that all the springs about the Narran that are known to him are found in the murrillo conglomerate; some of them rising above the surface and some, like those of Gerrarra, only coming to the surface. This seems to confirm the opinion which I had already formed, that the murrillo conglomerate, where it shows in the north-western part of the Colony, is very much older than the western plains, being part of an older continent, and from the Barwon River to beyond the Warrego forms a sort of bar which obstructs the flow of the underground water to the south-west and so causes it to rise up to or near the surface in many places, by flowing along the surface of the conglomerate whenever there is a slight deposit of sand between the clay and the conglomerate, as at Gerrarra.

If the geological history of this conglomerate could be written, I believe the formation of all the interior of Australia would be made clear.

After leaving the Queensland border I followed the Narran River down to the lake, which terminates its course, and which, when I visited it, was almost full for the second time, as I was informed, since its discovery. The first time that Narran Lake was full, and the only time it overflowed, so that the water reached the Darling, was in the great flood of 1864. The Narran River is one of the branches into which the Ballonne divides before emptying into the Darling, and the only one which does not reach that river, but after a course of about 100 miles in New South Wales falls into a depression in the country and forms a lake.

The Narran Lake has, I believe, been dry more than once since it was first discovered, and as I was informed by some of the old hands in that part of the country, will not last much more than a year after the Narran ceases to flow into it. The lake, or rather the two lakes together, are about 15 miles long, and in one place about 8 miles wide, and cover, as nearly as I could estimate it, an area of about 35,000 acres.

The two lakes are connected by an opening of about 200 yards in width, through which the water flows from the northern lake which receives the Narran River into the southern lake, which has no apparent outlet, but from which I was informed the water flowed into the Darling in 1864 but never before or since, and there is no channel of any kind from the lake to the river. The depth of the water in the deepest part of the lake was variously stated at from 8 to 12 feet, and though the splendid sheet of water which opens on the traveller's view—the most magnificent and refreshing sight that one could see in a dry country—gives the idea of much greater depth, I have no reason to suppose the estimate is very far wrong, as the men from whom I obtained the information had seen it full and empty, and the estimates of several only varied to a small amount. The Narran River flows through a very level country, with a fall of somewhat less than a foot to the mile, to the south-west, and in many places the channel is very small, the water spreading back for miles on both sides at every flood; but for some distance before entering the lake the channel is well defined and capable of carrying a considerable body of water, being about 40 yards wide, with steep banks. My estimate of the fall is obtained from the distance to which dams throw back the water, which I found in most cases was about a mile for every foot of the dams. At the time of my visit to Narran Lake, or Narran Water as it is more commonly called, the river had ceased running for about six weeks and the lake had begun to shrink, showing a considerable stretch of land round the edge which had been recently covered, and I noticed in the channel which connects the two lakes that there was a current flowing at the rate of about half-a-mile per hour from the northern lake which receives the

river into the southern lake, which has no apparent outlet. The strange thing about this lake is the enormous quantity of water which flows into it without finding any apparent escape, and still the lake does not fill, except in rare instances, when a very wet season in Queensland keeps the river in flood for many months, or even more than a year, as was recently the case. To judge by the quantity of water which comes down the Narran, and the area and depth of the lake, one would think a week would be ample time to fill it to overflowing.

Mr. Simpson, the manager of the Boorooma run, on which Narran Water is situated, told me that the river had been running into the lake for thirteen months before my visit, and for a considerable part of that time the river was several miles in width, and as the station where Mr. Simpson resides is situated on the Narran River, about 8 miles above the lake, he would of course have a good opportunity of observing it. I endeavoured to form an estimate of the rate at which the Narran flows into the lake when the channel is full by examining the crossing-place where the station hands swim their horses across, and getting them to show me where the horses come out on the opposite side. I found that in swimming, a horse was carried down about a yard and a half for every yard of progress made towards the opposite bank, which would give by my estimate a rate of current of about 5 miles an hour. Everything about this Narran Lake would lead one to the conclusion that there is an underground outlet, but whether connected with the Darling or some subterranean river it is impossible to say with certainty. The latter seems the more likely conclusion, as if it were connected with the Darling it is scarcely possible but that the place where the Narran water reached the Darling would be noticed, as the Narran often comes down in flood when the Darling is quite low, and at such a time any considerable accession of water in the Darling such as the Narran would give would not fail to be noticed. I could not find that any careful examination had ever been made of the bottom of the lake when it was dry, but one stockman who had been on the run for some years described it to me as full of large holes. The fact that after the river had ceased to run for six weeks there was still a current flowing from the northern to the southern lake would go to show that the water was escaping more rapidly in the southern than in the northern portion. Narran Water seems to be a perfect paradise for water-fowl of all kinds, as they are to be found there I may say in millions. On one occasion last year I rode along the water's edge for about 10 miles, and for the whole distance it was covered for some hundreds of yards from the shore with ducks of all kinds and wild geese, and a little further out were vast flocks of stately swans and pelicans gliding over the shining water, while along the shore I sometimes started little lots of wild turkeys, and

once a herd of wild pigs that were wallowing in the shallow water The channel of the Narran River, which has a fringe of low gum-trees on each side near the lake, has been taken possession of for about 5 miles upwards as a breeding place for the cormorants, and at the time I was there the young birds were just fledged and still in the nests in tens of thousands, and the old ones were fishing in the channel in such numbers that the water was almost black with them in places.

This is not by any means a pleasant part of the lake to approach, as it is scarcely possible to bear the effluvium from the fragments of fish that are lying under the trees, and which pollute the air for a considerable distance round, while flocks of the common carrion crows are acting as scavengers. To judge by the numbers of rotting fish lying under every tree, one would be safe in coming to the conclusion that the scavenger staff was altogether inadequate to the work which was to be done. On getting off my horse and approaching the trees on which the nests were built the young birds would immediately throw themselves on to the ground and scramble into the water, disappearing in a moment. How they ever got back again is rather a puzzle. The great quantities of fish in this lake would seem to contradict the stories of the water ever drying up completely, and yet the fact is affirmed by so many different people that there does not seem to be any reason to doubt it.

I left the Narran Water on the 13th of August, 1880, and reached the Darling the same day, and afterwards followed it down to Brewarrina, or the Fishery, as it is called in that part of the country. Brewarrina gets the name of the Fishery from the fact that it is situated on a part of the Darling where there is a rocky bar which forms a fall, or rather a rapid in the river, and which has been utilized by the aboriginals to construct a great number of little yards or traps into which the fish are led through winding lanes, which form a sort of maze out of which they are unable to return. All the work is done with stones built loosely into walls 3 or 4 feet high. Of course when there is more than 3 or 4 feet of water in the river the traps are useless, but as it is very wide at that place it takes a considerable fresh to overtop the traps. This fishery represents a considerable amount of combined labour, and as it is one of the few public works if not the only one ever constructed by the aboriginals it would be most interesting to know what were the regulations enforced by the tribe for its maintenance in good repair, and for the division of the fish obtained, and also whether outside tribes were allowed to share in the proceeds, and if so, upon what terms. It would be possible yet to obtain this information, as some of the blacks that were there before the country was settled are still to be found. I crossed the Darling at Brewarrina and went up the Mara Creek, which is formed by the overflow of the Macquarie River, and enters the Darling above Brewarrina.

The country improves very much, from a grazier's point of view, as one goes up the Mara from the Darling, consisting of salt-bush plains, interspersed with belts and clumps of low timber, but is very badly watered, as Mara Creek has no natural drainage—no creeks running into it—and is only filled when the Macquarie rises above a certain height in flood, being, in fact, dependent on the rainfall of the western slopes of the great Dividing Range, and on these slopes a considerable flood rain must fall before any water reaches the lower part of Mara Creek. Mr. Yeomans, of Gilgoin, showed me a well, which is situated about 10 miles east of Mara Creek and 15 miles south of the Darling, which there flows east and west. The well or spring is called in that part of the country "the cuddie," which I was informed means, in the language of the aboriginals, "bad water"; but as I have heard of two or three places about there called by different names, all of which were said to mean "bad water," I am somewhat doubtful of the meaning, and not having had an opportunity of questioning any of the blacks, I merely give the interpretation for what it is worth.

It may be that there has always been such a variety of bad water about there that the aboriginals invented many words to describe it. Just as we find in the Latin language more words for killing a man than in any other, the Romans being more addicted to that amusement than any other nation, and in the English we have I believe more words for getting drunk than in any ancient or modern language, showing, I suppose, that we have always been given to strong drinks.

The well is situated in a country, as far as I could judge, perfectly level, consisting of salt-bush plains and thinly-timbered land, and the soil a red clay of great depth, as a well has been sunk a few miles from the one I am about to describe, in the same sort of country, to a depth of 240 feet, without any signs of water, and all through the same clay. The cuddie is situated in the centre of a local depression, which gradually slopes to the well or spring from every side, and is something over a quarter of a mile in diameter.

This depression is filled up with water in wet seasons, and from the marks left on the trunks of the trees by the water I should say the centre was about 5 feet deep. The slope from all sides is so gradual that, if it were not for the water flowing in and filling up the hollow, it would be impossible without levelling instruments to tell that there was any depression at all; but after the water has retired, the trunks of the trees, to the height at which it stood, are discoloured, so there is a permanent record of the levels. When the country was first taken up, the cuddie was simply a bog-hole, which never dried up—always, even in the greatest droughts, affording water to the aboriginals when they scooped it out, but forming a dangerous trap for cattle, as, in dry times, they were sure to be tempted in looking for water, and,

once in, it was impossible for them to escape from the thick tenacious mud. In the last drought, of 1877, Mr. Yeomans fenced the boggy ground in, and sank a well to the depth of 28 feet in the centre of it, and, as he went down, found the water rising up from the bottom all the way at the rate of 2,500 gallons per day, or about 100 gallons an hour. When the well had reached the depth of 28 feet, of course there was an embankment formed by the clay excavated some 2 or 3 feet high, and it was found that the water rose over the top of this, so that it was possible to convey it to the outside of the enclosure and so water stock on the firm ground. But the most remarkable thing was that from the surface to the full depth to which the well was sunk the earth was found to be full of fossil bones in a splendid state of preservation, many of them being beautifully enamelled as if with some deposit from the water. Mr. Yeomans told me that many of the bones were thicker than a man's leg, and the skeletons seemed to be complete just as the animals had sunk into the treacherous ground. A bag was filled with some of the bones and taken home, and from time to time they were given away as curiosities to different people until, at the date of my visit, all had disappeared except about a dozen fragments of jaws and teeth, which were retained by Mrs. Yeomans on account of their ornamental appearance; and in this I believe that lady has done something for science, as the late Mr. Krefft, to whom one of the teeth was sent, was of opinion that it belonged to a new species of crocodile.

The remaining fossils were given to me, and I brought them down for the purpose of settling the species to which they belong. The most of them, I believe, are teeth of diprotodons and the large extinct kangaroos; but some, which seem to belong to other species and may perhaps be new, I have sent to Professor Owen, for the purpose of obtaining his opinion of them.

At the time of my visit there had been some heavy rain, and the water round the cuddie was about 2 feet deep and very muddy, so that I was not able to make a careful examination of the earth that had been thrown out in sinking, but on taking up a few handfuls from under the water, in which I was compelled to wade, I found it to consist chiefly of clay with some coarse sand and a large proportion of fragments of fossil bones. I obtained from among the debris a complete fossil, which seems to be one of the bones of the foot of some animal. This cuddie is, I think, well worth spending some money on to obtain the bones, as they seem to be so well preserved, and I have suggested to Mr. Wilkinson, the Government Geologist, that if there is any money available for such a purpose, it should be expended there. It seems probable that a complete collection of the bones of all the animals inhabiting that part of the Colony in past times could be made, as all kinds of animals must have fallen into the trap, and the water of the spring,

which is quite clear, insomuch that the bottom of the well can be seen through 28 feet of it, seems to have a preservative effect which would have kept them in a good state. The fact of the animals having sunk into soft mud and never since having been disturbed or rolled about by flowing water, would lead one to expect that very complete skeletons would be found by carefully excavating.

The water of the cuddie is rather sweet-tasted and good for stock, but has a strong purgative effect on human beings. It is rather hard to understand how animals so large and heavy as the diprotodons and gigantic kangaroos could have existed there when the country was in the same state in which it is now, or, if they were capable of existing in a country like that about Mara Creek, why they should have disappeared at all.

The fact of so many bones being collected in this place would go to show that the country must have been, when diprotodons roamed over it, subject to drought, and water at times very scarce, so that these extinct animals were tempted to their destruction just in the same way that cattle are entrapped now; and yet one would suppose that to support animals so large and heavy a much more luxuriant vegetation would be required than that we see at present. The depression of which the cuddie is the centre is also rather puzzling, as if the water had at any time brought with it anything capable of being deposited one would expect to find the ground just round it higher than the rest of the country. The explanation of this is, I think, that as the water rose to the surface and converted the clay into mud, all kinds of animals coming in and going back again (when they were not entrapped by getting into the centre, which is the only place where the bog is deep), would take with them some portion of the very tenacious clay on their feet, and this going on for long ages would be sufficient to form a depression in the plain which would increase gradually in depth until the slope would be such that the soil carried into it by rain water would just balance that taken out, after which it would continue at the same depth.

This question has a considerable interest in reference to what are called gilgies. In all the country about the Darling, but more especially in that stretch of dry country lying between the Lachlan and the Darling and the Bogan Rivers, which is in most places very level and without any defined water-courses, at intervals scattered over the country, sometimes in groups and sometimes alone, are small holes which contain water for a considerable time after rain. They are of all sizes, from 30 or 40 to a few yards in diameter, always approach a circular form, and are never, as far as I saw, more than about 5 feet deep. All the gilgies that I saw, and my travels extended over about 4,000 miles, were situated in country so nearly level that the water flowing into them had not sufficient force to cut channels of any

kind, and also I noticed that they were larger and deeper the farther they were situated from any permanent water. Of course there must be some way of accounting for this, and there must be some reason for these gilgies being in existence. I think it is absolutely certain that they have not been excavated by flowing water, as even after they are formed the water has not sufficient power to cut channels into them, and in no place could I find them arranged in such a way as to indicate a water-course. No one who has not seen the Western Plains of Australia can have any idea how nearly they approach a dead level. I was once caught in a very heavy thunderstorm in the country west of the Bogan when, after rain had been falling for some hours, the country was covered with water to a depth of about 2 inches, and it was impossible to notice that there was a current in any direction, the water seeming to be perfectly still. I have seen some waterholes in the neighbourhood of Cobar that are called blackfellows' tanks, which are supposed to have been excavated or at least deepened by the aboriginals as camping-places in their hunting expeditions, when they left the river frontages after wet weather; but these are easily distinguished from the gilgies proper by the fact that at the blackfellows' tanks the clay excavated is still to be seen beside the waterholes, while in the gilgies there is no appearance of any embankment, the ground all round being perfectly level. I would account for the gilgies being few and shallow in the vicinity of water-courses or permanent water, and more numerous and deeper in the dry country, by supposing that, in the country close to permanent water, if there happened to be a depression which held water for a time there would not be any great traffic of animals to it, as they would go to the more permanent water, and any mud carried out would only be by accident as it were, while in the dry country if there happened to be the slightest depression which held water after rain, there would be a large number of animals going to it, and the number using it would continually increase as the gilgies became more permanent.

The wild animals would use it as the cattle do now, as a sort of outpost, to enable them to get farther back and to remain longer out where the struggle for existence would not be so severe as along the rivers. The explanation that the gilgies have been placed where we now find them providentially, to enable the squatters to water their horses and working bullocks while they are excavating permanent tanks, though it possesses the advantage of simplicity, is not, I think, satisfactory. I know it may be objected to my explanation that if it is necessary to suppose a natural depression to start a gilgie, why not suppose all gilgies to be natural depressions? But any one who has examined them will, I am sure, be convinced that some other agency than that which originally formed the plains has been at work in forming and maintaining the gilgies. It is easy to account

for the formation of small natural depressions a few feet or yards in diameter, as we see them made almost every season. When the ground cracks, and afterwards rain falls so as to close up the cracks, the surface does not return to a perfect level, but every place where a crack was situated forms a hollow by the falling in of the sides, and any of these hollows, if situated in a dry country and capable of holding water for a time, would be sufficient to start a gilgie. There is another way in which gilgies might sometimes be started, and that is by means of openings through the clay surface soil communicating with some more porous strata underneath or with some underground watercourse.

In most parts of the Darling watershed where I have been, but more particularly on Messrs. Cross and Featherstonhaugh's run, which is situated between the Culgoa and Warrego Rivers, there are to be seen depressions of 2 or 3 feet in depth and sometimes 4 or 5 yards in diameter, with one or more holes in the bottom, through which the surface water escapes downwards. These depressions have evidently been formed by the surface water carrying down with it some portion of the clay soil, and of course must communicate with some much more open strata to allow of the clay being carried down. One can easily understand that after a depression of this kind was formed, if the holes in the bottom got stopped up by any means so that water would stand in the hollow, a gilgie would be the result.

I could not hear of any one having attempted to sink a well in one of these depressions, although it seems to me they would be most likely places in which to search for water. The well-known fact that any well will receive, without raising its water-level, a quantity of water per minute exactly equal to that which may be taken out of it, coupled with the fact that enormous quantities of water rush down through these openings for days after heavy rain, would lead to the belief that they communicate, in many cases, with supplies of water that would be inexhaustible; and one might also infer, generally, from the fact of the surface water having found its way through the clay at these places, that there the clay is of least thickness and the water-bearing strata nearest to the surface.

After inspecting the runs on Mara Creek, I had to go out to that part of the Colony near the northern boundary, where the Warrego River enters from Queensland, for the purpose of appraising a run called Gerrarra. After crossing the Darling at Brewarrina, for the second time, I went out to a station called Quantambone, situated on the Cato Creek, about 4 miles north of Brewarrina. The Cato is a creek which flows out of the Darling above Brewarrina, and returns to the main channel again after a course of a few miles. The Quantambone, or Cato Station, as it is now called, is the property of Mr. John Todd, and by him

I was told of a remarkable sight which can be seen any fine morning from the place where his head-station is situated. At the back of the Cato head-station, in a north-west direction from the Darling, is a very large extent of timberless country, there being nothing in view as far as one can see to the north and west but a grass-covered plain. On the morning after I reached the Cato I got up about half-an-hour after sunrise, and, looking out across the plain to the north-west, I saw, at a distance apparently of about 3 or 4 miles, a long line of cliffs extending north-east and south-west for several miles, seemingly about 400 or 500 feet high, crowned with a thick growth of trees and seamed all along the face by gorges and ravines, on the sides of which trees seemed to be growing. I examined it carefully with an opera-glass, and found that if I had not seen the open plain before, and did not know that there was no such cliff, it would be impossible to tell that it was not real. In that part of the Colony, where there is such a dead monotony produced by intensely level plains and stunted trees, with sluggish streams of muddy water wandering about as if they were uncertain as to which way the fall of the country is—where clear water is only a tradition—the sight of something in the shape of mountains is peculiarly refreshing, even when one knows it will all disappear within an hour. As the sun rose the cliffs seemed to fade away, and in about an hour all had disappeared.

There are no cliffs like those appearing at the Cato within some hundreds of miles of the place, which makes it more difficult to understand how this peculiar appearance is produced. Lines drawn from the apparent position of the sun just above the horizon to the spectral cliffs, and from the sun and the cliffs to the position of the spectator, would form an equilateral triangle, with the sun in the north-east and the cliffs in the north-west and the spectator at the southern point. That the same spectral cliffs and nothing else are to be seen at the same time after sunrise every clear morning, in the same place—that the trees and cliffs are not reversed, and that it is not raised into the air, but seems to rest on the plain in the most natural way—are facts by which it differs from all other spectral appearances of distant scenery produced by refraction of which I have read.

Mr. Todd informed me that there is no appearance of the cliffs if the morning is at all hazy or cloudy, and on a second occasion when I looked for it, the morning not being quite clear, there was nothing to be seen at all.

The whole scene, as I saw it in August of last year, is exceedingly beautiful and will amply repay any one for the trouble of getting up early or for the trouble of going to Brewarrina, even when, as in my case, there is left an unsatisfactory feeling of not being able to understand it.

I reached Gerrarra three days after leaving the Cato, and had an opportunity on the way of examining the cane swamps as they are called, of which I have more to say further on. Gerrarra, or Gerrarra Springs, belongs to a Mr. Shearer (who is a very old resident in that part of the country), and is only remarkable for the springs from which the run takes its name. There are two springs situated within about a mile and a half of each other in a line running about north-east and south-west, and Mr. Shearer told me they formed part of a line of springs extending in the same general direction, which were known to him for a distance of 150 miles, the springs being in some cases like those at Gerrarra, close together and in others separated by long intervals of waterless country. Some of the springs in this line overflow and some, as those at Gerrarra, only rise to within a short distance of the surface. Mr. Shearer has made an excavation in the rock at the mouth of each of the springs of which he is the owner, and draws the water out by horse-power for his stock, and as the springs do not supply water as fast as it is drawn out, I had an opportunity of examining the formation both above and below where the water is coming out of the rock. I found that near the surface there was about 4 feet of a soft coarse red sandstone, unlike anything I had seen anywhere else on the Darling, with apparently a slight dip to the south-west, and under this about 4 feet of a coarse light-coloured sand slightly cemented together, out of which the water was coming. The cemented sand was resting on a very hard conglomerate, composed chiefly of quartz pebbles; in fact, the same conglomerate which has already been described in this paper under the name of the murrillo conglomerate.

The water is, I believe, not affected by droughts, and stands in these springs at a few feet below the general level of the surface of the country, not flowing over but standing always at the same height. They are situate nearly midway between the Culgoa and Warrego Rivers, being about 26 miles from the former and 35 miles from the latter, and about 20 miles south of the Queensland border. The cane swamps as they are called are a remarkable feature of the country on the Warrego, between the Queensland boundary and Bourke, and though I have seen some in other parts of the Darling country they are not, in any other place where I have been, developed to anything like the same extent as in the country east of the Warrego and about 30 miles south of Queensland. They are stretches of country sometimes several miles in extent, composed of a white clay, perfectly level, and almost as smooth and hard as a billiard-table, thinly covered with a kind of coarse grass about 4 feet high, resembling small canes, called in some places cane grass and in others Wilkie grass, and all through these cane swamps there are small islands, raised about a foot above the general level, scattered over most of the flats, and on these islands, which

are composed of a better and more friable soil than the flats, the cane grass does not grow, but instead we find different kinds of salt-bush such as grow on ordinary salt-bush plains. The islands seemed to have been formed by the accidental accumulation of the dust which is blown about in that country in such large quantities in dry weather.

The cane swamps wherever I have seen them are always a little lower than the general level of the surrounding country, so that the water runs down in wet weather and covers them to a depth of some inches, and the clay of which they are formed seems to be quite impervious to water and different from any other clay that I have seen. There is nothing swampy about them, except that they are covered for a considerable time after wet weather with water, as I have driven a heavily loaded buggy over some of them when the water was about 2 inches deep and found that the wheels did not sink into the ground at all but ran smoothly over it as if on an asphalt road.

From the very impervious nature of the clay and the perfect level of the surface they seem to form fine catchment areas for tanks; as if a tank is made in any part of the cane swamp all the water which falls on that particular flat will find its way into the tank without the necessity of making expensive drains, as has to be done in most other parts of the country. The only drawback seems to be that, as the clay is so very fine, if the animals are allowed to go into the tank the water is sometimes made thick and undrinkable; but this is a drawback which affects more or less all tanks in the Darling country, and the only remedy is to prevent the stock from going into the tanks at all.

I had an opportunity when I was out there of examining some tanks that had just been excavated in cane swamps and which had not been filled with water, so that I could see what the clay was like to a depth of about 18 feet, which is the greatest depth to which these excavations are carried. I found that the clay, even to the full depth, was just the same as on the surface, and all through it wherever I examined an excavation, were to be seen nodules of gypsum but no sand or stones of any kind—nothing but the perfectly smooth clay and the crystallized gypsum, and on making inquiries among the people who have been sinking tanks in such places, I was told that they never find anything but the gypsum mixed with the clay—no stones or gravel in any case. What makes this fact remarkable is that though the cane swamps wherever I saw them have every appearance of being large depressions in the general level of the country which have been slowly silted up, and though there does not seem to be anywhere in that part of the country any land high enough to give water a sufficient impetus to carry into them stones and gravel, still we find scattered over the present surface angular fragments of what seemed to me to be ordinary trap rock.

These fragments, which are of all sizes up to about 3 inches in diameter, have no appearance of having been carried along in water, as the corners are perfectly angular, and they are not embedded in the clay, but rest on the surface as if they had only been just laid there. I could not find out where they came from, and the fact of their not being mixed through the clay but only on the surface makes it improbable that they have been carried into their present position by moving water, even if there were any high land in the neighbourhood from which the water could have come, which there is not, and if they had been carried a long distance the stones themselves would show some signs of their journey. An explanation, offered by Mr. Crosse, a squatter in that part of the country on whose run some of these cane swamps are situated, that the stones are of meteoric origin seems to me not to meet the difficulty. First, it seems strange that there should in that part of the country have been such a very large shower of meteoric stones when in the rest of the world showers in which large quantities of stones fall are of such rare occurrence; and second, if such a shower of stones fell, many of them 2 or 3 inches in diameter, one would think that they would fall with such force as to bury themselves in the clay and not be as we see them on the surface.

I regret very much that I neglected to bring a specimen of the stones with me, but I hope soon to obtain some with a view to testing the meteoric theory. After leaving Gerrarra I came through Messrs. Crosse & Featherstonhaugh's run, and on to Bourke, where I crossed the Darling again, passing on my way a very interesting part of the country in which are situated some very peculiar mud springs. I did not at any point come within less than 30 miles of them, and as my horses were almost worn out, and I found it quite impossible to buy fresh ones about there, I had to give up the idea of examining them. I believe they are to be found scattered over a large area of the north-western part of the Colony, as I heard of them being in many places, and from descriptions given to me by people who are living in that part of the country I should think they are a sort of natural artesian wells in which the water forcing its way up under great pressure converts so much of the clay into mud that little or no water reaches the surface. They have been described to me as pyramids of mud oozing up out of the ground, with sometimes a little water, standing in any depression which may be formed on their surface, and this water, when there is any, is, I believe, always fresh. The fact that where attempts have been made to sink wells in the mud springs they have always failed through the mud forcing its way in, sometimes bursting the timbers and always filling the wells up, seems to show that the water must be under great pressure and would rise freely to the surface if a way were

opened for it. I should think that the cheapest method of testing this would be by means of tube wells, which could be forced down through the mud almost to any depth, and if, as seems very probable, there are water-bearing strata of sand or gravel under the clay, when they were reached the water would rise freely through the pipe and flow over the surface. Tube wells have been driven in America to depths of 200 feet and upwards without any very great difficulty, and surely as much can be done here. Along the Darling, from Bourke to Louth, there is nothing very remarkable about the country. Small isolated mountain ranges are to be seen in the direction of Cobar, but as I did not approach any of them I cannot say what is their geological formation. The rest of the country is very level, and the timber the same as in all the other parts of the Darling frontage where I have been—in fact from near the Queensland boundary to Louth there is no variety about the river at all.

At a station which I was inspecting, near Louth, I saw a rather curious effect produced by mixing salt water from a well with some very muddy water contained in a tank adjoining.

The well was 140 feet deep, and the water contained in it very salt and offensive to smell, and as the water in the tank was getting very low and thick from the trampling in it of stock, the proprietor thought to make it go further by mixing some salt water from the well with it.

On the evening of my arrival the water in the tank was of the consistence and colour of pea-soup, and two men had just started with a single bucket and windlass to draw out the salt water from the well and empty it into the tank. This continued for about two days, until the time of my departure, when I noticed that the water in the tank had become almost quite clear, having deposited a thick sediment at the bottom, and was free from any offensive smell, and on tasting I could just detect the saltness of the well-water. The proportion in the mixture was not, I should think, more than one of salt water to twenty of muddy, and the appearance was as if some chemical combination had taken place between the salts contained in the well-water and the mud in the tank, and that the water was not capable of holding in suspension the result of the combination.

From Louth I returned to Bourke, and, after providing myself with fresh horses, started out into the dry country situated between the Darling, Lachlan, and Bogan Rivers. There is a large piece of country almost enclosed by these three rivers, over 200 miles across and 300 miles long, without any permanent creeks or rivers, and very little water of any kind, except what has been made artificially. It has all been leased and almost all occupied since the possibility of watering dry country permanently by means of tanks became known ; but prior to that era most of it was blank

space on the maps of the Colony. The country seems to rise with a very gradual slope from the Darling, at Bourke, in a southerly direction towards the Lachlan for about 150 miles, to near Gillgunnia, and all the water up to that point goes in the direction of the Darling, but there are no water-courses marked on the maps and no well-defined water-courses on the ground, except close up to what may be called the Dividing Range, where the country rises into tolerably high mountains—that is, in the neighbourhood of Gilgunnia—and from there the ground, as far as I could see, seemed to fall in the direction of all the three rivers named—this being, as it were, the centre of dispersion. The gullies coming out from the mountains are numerous enough, but they all seem to disappear on reaching the open country. The high ground is chiefly granite, but all through the level country where I have been, at distances of from 10 to 20 miles apart, there are hills scattered about, generally cone-shaped, that I found in some cases, where I had an opportunity of examining them, to be composed of trap. Springs are to be found in some places among the mountains, but as they seem to be only the result of local drainage they are not of much importance except to the owners. There is a creek called Sandy Creek, not very well defined as to its channel and not marked on the maps of the Colony, nor even on the run maps of the Occupation Office, which rises at Mothumbil, about 30 miles east of Gillgunnia, and flows to the westward in the direction of Wilcannia, and through this creek all the surplus water of that part of the Colony finds its way, but whether it ultimately reaches the Darling or not no one seems to know.

I could see from the drift wood that heavy floods sometimes pass down it, but except in flood-time there is no water apparent in the channel. By digging in the coarse sand with which it is almost filled, water could be got at the time I was there in almost any place at a depth of about a foot from the surface, and in this way a good deal of the stock belonging to lessees of land through which the creek passes are watered. All along Sandy (or Crowl Creek, as it is called in some places), which has not been made a water frontage in laying out the runs, the lessees seem to know little of the water-course beyond their own properties. The exploring spirit does not seem to have induced them to trace it either way, and I was only enabled to find out where it rises through having to follow it up to where the head is situated, for the purpose of an appraisement. I found it quite impossible to get any certain information as to where the water goes which passes down it, some squatters asserting that it ran into the Mallee country and disappeared, some that it spread out over the level land and sank into the ground, and others that it entered the Darling near Wilcannia; but I did not meet with any one who could speak from personal knowledge.

The work of stocking this dry country is a slow and laborious process, and there has been a considerable amount of hardship and danger attached to it, but within the last four or five years so many stations have been made and so much country fenced that the hardships and dangers have been very much lessened.

The area of unstocked and waterless country has been so much reduced and the stations already established can now be made a basis of operations to enable the intending squatter or back-blocker, as he is generally called, to get out on to that which he is about to stock. But though the making of tanks and stocking new country has been going on faster round Cobar for some four or five years past than in any other part of the Colony, there is still a very large area held under lease without any water or stock on it. The work has been slow, because even when the lessee can command capital it is necessary first to go out immediately after rain, which has been heavy enough to fill the gilgies, and make a careful inspection for the purpose of determining the places in which tanks are to be excavated. This is perhaps the most important work of all, as a failure with the tanks, either by excavating them in places which will not hold water, or where from the nature of the soil or the fall of the ground they will not fill in moderate rains, means not only a serious loss of money but a still more serious loss of time. After the situations for the tanks have been fixed on, in all probability the gilgies will have dried up before men can be got to do the excavating, or in many cases there may be no gilgies where the tanks are to be made. Then the back-blocker must get leave from the owner of the nearest tank where water can be got to draw it out in waggons to where the work is to be done. Leave being obtained, and I believe it is never refused, a waggon is set to work with a couple of 400-gallon iron water-tanks and eight horses—water drawn out and men set to work to excavate a small supply tank by manual labour, and when this is done there is often a long period of waiting for rain to fill the supply tank.

The supply tank being filled sooner or later, a large gang of men is set to work with drays, ploughs, scoops, and teams of horses or bullocks, to excavate a permanent tank, watering themselves and their draught animals in the meantime at the supply tank which was first excavated. After this comes another period of waiting for rain to fill the tank, and waiting for rain in that part of the Colony is generally weary work, but at last the first tank is filled and then all goes on merrily until a drought comes. The station-buildings are erected, stock bought, and fencers and tank-sinkers set to work in all directions, drawing their supplies of water in drays or waggons from the first tank excavated. Of course if there are a few good gilgies that will hold water for two or three months scattered about the run there will be a great

saving of time, but even then, and when capital is plentiful, the lessee will in very few cases get any return for his expenditure until after the lapse of at least two years, and the time may be extended by a few adverse seasons to four or five years, which would mean to many an enterprising and energetic back-blocker absolute ruin. The long stern struggle with the adverse forces of Nature goes on from day to day, and year by year continually increasing quantities of wool with gold and other valuable metals are passed through our ports. These are the spoils, and the export entries are often the only records of victories as great and glorious as any that have ever been won by "the hardy Anglo-Saxons, to whom the waste places of the earth have been given for an inheritance." The work that is being done, watering, stocking, and prospecting back country, where hardships and dangers have to be met and where lives are sometimes lost, is not done with any public or patriotic object in view; but, nevertheless, the public will and do reap the benefit, and the men who undertake it deserve all the honour and encouragement that can be given to them.

We see and hear much of the successes, but the failures—the cases in which money and youth, and courage and energy, and even life, have been expended in vain—go unrecorded. I suppose there must be failures; sacrifices must be offered to the spirit of progress--often the best we have; but when the victory is won, is it well to reward with abuse those who have fought the battle for us, and to forget those who have gone down in the struggle?

The spirit of chivalry which urged the knights-errant of old to go forth redressing wrongs was not so true nor could it produce so great an effect as the spirit of enterprise which to-day urges the modern representatives of these same knights further and further into all the unknown places of the earth; and the cry of "Westward, ho!" which was raised in Elizabeth's reign, did not do more for Englishmen than the "Westward, ho!" of to-day will do for Australians.

When Jack Smith, with his trusty revolver at his side, goes forth into the unknown wilderness in search of a new run or a new gold-field, risking all that he has, even to his life, he is doing as good work, and, although he is unconscious of it, is as much a hero as the best knight of ancient days.

These back lands had little or no value in their natural state, and the value which they now possess is chiefly that which has been given to them by the money and energy which have been expended on them, and these certainly formed no part of "the public estate."

To people who have seen these things and know what settlement in the dry back country really is, it is not a little disgusting to hear the outcry that is continually being made about great

fortunes acquired out of "the public estate" and at the public expense, and the outcry is loudest among the people who have taken no part in the struggle, and whose wages, work, and business are being increased by what is going on. The reward which the squatters, and more particularly the back-blockers, receive, taking into consideration the numbers engaged in the work and the proportion of successes to failures, is not excessive, and prospectors seem to get for their reward, in ninety-nine cases out of a hundred, nothing at all.

If the sale of land in all the outside country, except for the purpose of town and suburban settlement, were absolutely forbidden under any tenure whatever, it might be possible for the Government to deal justly with all parties, and the people who come after us would have a great and valuable public estate, not cut up with auction sales or selections, and in the meantime a fair rent would be willingly paid. At present there is too much uncertainty, and the public is the greatest loser by it.

All the country from the Bogan west, for a considerable distance beyond Cobar, is probably rich in minerals, but the difficulty of properly prospecting it is immensely increased by the fact of there being no water-courses or creeks. First, because of the scarcity of water, and second, because in no case can one find a section of the strata such as is so common where a country is cut up by rivers and creeks; and third, because whatever may have been the original features of the country by far the larger proportion of it now is covered up with a fine red clay, which gives no indication of what is under, and which is exactly the same over thousands of square miles.

When one considers that in this part of the Colony the area in which the rocks show is not, as compared to that which is covered with clay, more than one in a thousand, if so much, it is matter for surprise that so many mineral lodes have been found. The idea left on my mind after driving through it in various directions was that it had been originally a very broken country, which had sunk down evenly, and after being covered with water for a long period, during which the valleys had all been filled up with clay, and only the summits of the mountains left projecting through, an upward movement in recent times, geologically speaking, had cleared the water off and left it as we now find it.

My work as appraiser of runs ended at Mothumbil, and from there I made my way home as quickly as possible through Dubbo and across to the Hunter, noticing that as I approached the Great Dividing Range there was a gradual increase in the size and luxuriance of the trees, just as in the northern rivers I had noticed them getting smaller as I went west.

Before concluding this paper, I wish to make some remarks on the possibility of finding water under sufficient pressure to bring

it to the surface by boring in the Western plains. The materials at my command are not numerous, being very little besides Mr. Russell's rainfall observations and calculations as to the outflow of the Darling, and what I have been able to collect myself in a journey of about five months' duration, and they apply to a vast area of country, so that I am not at all sure that the time has yet come for arranging them and endeavouring to show what lesson they teach. But, on the ground that no harm can be done by opinions based on even a few facts, I have decided to make the attempt.

Before starting for the Darling, in June of last year, at the suggestion of Mr. Russell, the Government Astronomer, I wrote to the Honorable the Minister for Mines (in whose department the appraisers are) suggesting that a circular should be sent to each of the appraisers who were then starting for different parts of the Colony, asking them to make certain observations. Mr. Russell undertook to draw up the circular, and I referred the Minister to him as a guarantee that the object in view was of some scientific importance, and the few gentlemen I had an opportunity of seeing expressed their willingness to do the work required. I received a reply informing me that the Honorable the Minister for Mines did not think the appraisers should be delayed in their work, and for that reason would not forward the circular. However, as all the runs have to be appraised every five years, it is to be hoped that some future Minister may be advised to request the appraisers to make notes of all natural springs and wells giving a large supply of water in the Darling watershed, with the depth of the wells, depth at which water stands, whether affected by dry weather or not, and, if possible, the strata passed through, and to fix their position as nearly as possible on the map, and also to make similar notes in cases where deep wells have been sunk without reaching water. Such notes would be of great value in enabling people who have not an opportunity of observing for themselves to come to some conclusion as to the possibility of obtaining water in large quantities in any particular part of the interior, and also as to the probable depth at which it would be obtained, and would not increase the work of the appraisers nor delay them to any appreciable extent. They would, in fact, give scientific men, who are not, as a rule, to be found on the frontiers of civilization, an opportunity of attempting the solution of a problem which is of the very greatest importance to this and other Colonies. On the supposition that there is a great drainage system under the Western plains, taking away to the ocean that part of the rainfall which is not accounted for either by evaporation or by the outflow of the Darling River (and this seems to be almost proved), it ought to be possible, by careful observation, to trace the general direction and reach it in many places by means of

bored wells. There is such a sameness about all the Western plains, and the whole have so much the appearance of having been deposited as it were at a single operation extending probably over a very long period of time, and left undisturbed ever since, that it seems probable that the experience gained in any one place will apply to a very large area. The high mountain range which runs parallel to the east coast seems to continue to the west in Queensland, dividing the Darling waters from those of the eastern and northern rivers, and this would make it improbable, if not impossible, that the underground water should find its way to the sea either on our northern or eastern coasts. The maps of the interior of Australia are not, of course, very accurate yet, and it is only possible from them to make a fair guess at the general direction of the high land. But many things seem to indicate that all the western parts of New South Wales and Queensland, with part of South Australia, in times comparatively recent were depressed below sea-level and open to the ocean to the south-west, and this would be the direction which the underground water would most probably take. My chief reason for holding this opinion is that in no part of the western country where I have been is there any indication of a disturbance of the strata since the deposition of the great clay-beds of which the plains are formed. Wherever I had an opportunity of seeing the older rocks, the arrangement of the clay with reference to them seemed to indicate that it had been deposited in still water over or around them while they were in exactly the same state as they are in now, and that afterwards a gradual upheaval of the whole country had drained the water off, leaving an immense extent of almost level land, with the tops of what were the mountains of an older continent projecting through and forming those isolated peaks and ranges that are to be found scattered about through all the western country.

That the underground water would take the same general direction as the surface water seems probable, but that the underground drainage system is in any other way a counterpart of the surface system is not at all likely.

The underground water, as shown by Mr. Russell, must be immensely in excess of the surface water, and would, in a general way, flow towards what were the lowest parts of the original surface of the country before the vast mass of clay which now forms the surface soil was deposited, and where these lowest parts are situated, or what is the thickness of the clay with which they are covered, there are but slight grounds at present for forming an opinion. If my conclusions are correct there would in fact be two great river systems—one on the surface, carrying away to the sea a certain part of the annual rainfall, and one underground, possibly an ancient river system, carrying off by far the larger portion.

It may be that the underground water finds its way out along the bed of an ancient inland sea or gulf, something like the Baltic, in which case there would not be any well-definded drainage system, but it would pass along through the most permeable strata, and in either case would tend to rise above the surface wherever obstructions were met with. So little is known of what is under the western plains that it is impossible to say with any show of certainty which of these theories is the more probable. It would be possible to account for a great thickness of permeable strata underneath the present clay soil by supposing that at one period, when the western parts of Queensland and New South Wales, and eastern part of South Australia, were below sea-level, there was a connection with the ocean to the north through the Gulf of Carpentaria, and perhaps to the west through Western Australia, when a strong current flowing through would scour out the depression, depositing great quantities of sand in what were then the deepest parts; and afterwards, when the northern and western connections were cut off by the rising of the country, the mediterranean sea, which remained where the western plains now are, would be gradually silted up with the fine clay which now forms those plains. Never having had an opportunity of examining the country in Northern Queensland, or on the western coast of Australia, I cannot say much as to the probability of either of those connections having existed, but as far as I can learn from the reports of explorers there seems to be nothing to make them impossible or even improbable.

There is a well at Mr. Meddlicot's run, Booroora, 15 miles west of the Mooni River, and 6 miles south of the Queensland boundary, which, though not very deep, seems to be connected with some part of the underground drainage system. This well is 40 feet deep, sunk through 9 feet of dark-coloured clay impervious to water, 26 feet of hard cemented sand which crumbles down on exposure to the air, contains some waterworn pebbles, and is also impervious to water, and 5 feet of loose running sand; and the water on being reached rose to within 10 feet of the surface, coming up through the bottom in a thick spout. Mr. Meddlicot passed an iron rod 14 feet long down through the hole out of which the water comes without meeting with any obstruction. The water brings with it some sand and fills the well up to the level at which the loose sand was first struck, so that it has to be cleaned out from time to time. There is now in the well a large-sized centrifugal pump and a steam-engine attached, with which it is possible to clear out the water in about half a day; but the fact that the water can be reduced does not arise from a lowering of the source of supply, but only from the sand which comes into the well obstructing the inflow of water.

This is proved by the fact that a well, situated 100 yards from the first, sunk through the same strata, except that the cemented

sand begins from near the surface, dark clay being absent, reaching water at the same level in the same strata, and water standing at the same height, is not lowered at all by emptying the first well and keeping it empty when it has to be cleared out. The sand is somewhat coarser each time it is cleared out, and the most remarkable thing about it is that each time it is cleared out and free access allowed to the water, considerable quantities of charcoal, in rounded pieces about the size of a pea, are brought up with the water. This seems to indicate a very free communication at some point from the surface to the underground source from which the well is supplied.

Going west from Booroora we come to Gerrarra springs, which form part of the line of springs described to me by Mr. Shearer, some of which (the most westerly) rise above the surface, and if the others are like those I saw would seem to indicate a rise in the older formations by which the water is, as it were, dammed back and brought to the surface. Still in the same direction we reach the region of the mud springs on the Warrego and Paroo Rivers, which indicate a considerable head of pressure in the water that causes them. About 80 miles a little to the west of south from Booroora, on Mara Creek, there is the cuddie, which also has sufficient pressure to carry the water above the surface, and which is described in another part of this paper. On Tourale, between Bourke and Louth, I was told there is a flowing well, giving large quantities of water, but as my appraisement work did not allow me to inspect it I was unable to get many particulars. It is situated about 40 miles west of the Darling, but how deep it is, what is the quantity of water flowing out, or the strata through which it has been sunk, I was unable to learn. The general fall of the country as shown by my own notes of the distance to which dams throw back the water per foot of their height, and the general direction of the rivers, is to the south-west and is not more than 1 foot nor less than 6 inches to the mile in all the Darling country from Queensland to Louth, where I have had an opportunity of travelling. The fall is remarkably regular, and I think 9 inches to the mile is as nearly as possible the average from Mungundi to Louth.

That all these springs and wells draw their supplies from the same underground source, or should be capable of rising to the same level with reference to each other is not, I think, very likely, but that they are all connected with the same underground drainage system seems to me highly probable. Under any conceivable state of the strata beneath the clay beds which form our western plains the underground water would find its way towards the sea by many channels, spreading out in places where there was a great width of permeable strata to form what would be the counterpart of lakes on the surface, and narrowing in again where

the permeable strata were narrow, and winding about to a certain extent as rivers do on the surface; and it is quite possible that two wells, comparatively close together, might strike different branches of the same drainage system and the water stand in them at different levels. The same water which supplies the well at Booroora, if tapped at Tourale (although Booroora, where the water stands at 10 feet from the surface, is nearly 150 feet higher than Tourale), would not there rise 140 feet above the surface, but the rise would depend altogether on the freedom of the outlet from Tourale to the sea. Wherever the obstructions to the free passage of the water were great there would be upward pressure, and where the water-way was open there would be no tendency to rise above the surface, although the supply to be obtained by pumping would be just as great in one case as in the other. Tube wells will have an advantage over open shafts in so far as the water can be prevented from escaping through the sides in any fissure or porous strata that may be above the water-bearing strata.

This will be made clear by supposing a well to have reached a supply of water that comes in at the rate of 100 gallons per minute, with sufficient force to bring it up to the surface. When the water rises to any fissure or porous strata capable of absorbing 100 gallons per minute it will remain stationary there, as the outflow will exactly balance the inflow, while in a tubed well the outflow might be prevented and a rise obtained corresponding with the head of pressure whatever that might be. Of course it would be possible to tube an open shaft if there were any reason to suppose the water would rise to the suface, and the water could be prevented from coming up in the shaft, except through the tube, which would make it equal to a bored well.

The driest part of New South Wales is that piece of country lying between the Darling and the South Australian border, and there the indications are strongest that a large supply of fresh water would be obtained by boring, and that it would rise freely above the surface if an outlet were made for it. There is a large area of country in Queensland to the north of this, in which the rainfall is comparatively heavy, which seems to have no outlet for its waters by surface drainage, and the mud springs which are scattered about the country show, I think beyond question, that the water is there and that the force with which it tends to rise to the surface is very great. The only part of the western country in which I have been where it seems to me improbable that water will be got to rise up to or near the surface by means of boring is that piece of dry country between the Darling and Lachlan Rivers about Cobar. This is a large area of country without any well-defined water-courses, raised somewhat above the general level of the western plains, and from what I saw of it I am inclined to think that the older strata in which the clay rests are there above

the general level of the Darling country, and being cut off from the higher land on the east by a long stretch of country from near the Bogan to beyond Gilgunnia, in which the older rocks come to the surface, it seems unlikely that there could be any underground water except what is derived from the local rainfall. If, as I believe, it was before the clay soil was deposited a very broken and rocky country, which has been levelled up to a certain extent by filling the valleys with clay, then of course wells giving a large supply of water might be made if the original drainage valleys could be sunk into, but the water would not rise to the surface.

When Mr. Russell first put forward the theory of an underground drainage system to explain the great disparity between the rainfall in the watershed of the Darling and the outflow of that river, one of the difficulties which occurred to me was that if such a thing were in existence the surface rivers crossing the underground channels in all directions would in many places cut through the clay beds and form communications with the underground water, so that strong springs would be numerous in the Darling and its tributaries, but when one has examined the Darling and its tributaries this difficulty disappears at once. The clay soil, which is almost perfectly impervious to water, has been deposited evenly over the whole country. There is no tilting up of the strata anywhere that I have seen which would cause the rivers to cut across and expose the edges, and the rivers themselves are little better than shallow gutters cut in the clay.

The Mara Creek (which is the channel by which the Macquarie waters reach the Darling), the Namoi, Narran, Bokira, Culgoa, Warrego, Moonie, Bogan, and even the Darling itself, scarcely deserve the name of rivers. There are no great beds of sand or gravel under the water and extending out under the surrounding country, as in other rivers, and it is easy to see almost at the first glance that the rivers have had nothing to do with the present formation of the country through which they flow, nor have they even modified the surface to any considerable extent. The only change in the features of the country since the waters in which the clay was deposited passed off has been the cutting of a few shallow channels which now go by the name of rivers. There is no soakage of water from the rivers under the adjacent country, nor from the adjacent country into the rivers. At Ginge, near Walgett, I saw a well about 100 yards from the Darling in which the water was 40 feet from the surface, and when the Darling rose over its banks and flooded all the surrounding country the water in the well was not affected at all. On the Bogan I was told of a well having been sunk in the bed of the river during the drought of 1877, to a depth of 40 feet, through perfectly dry clay, without finding any water, and in another part of the same river

I saw a series of dams, by which the water was thrown back for a great many miles, and as far as I could learn there was no escape of water through the banks in any part; and it is the same in all the other tributaries of the Darling where I have seen or heard of dams being made. To one who has been used to the varying scenery of an undulating or mountainous country, the terrible sameness of everything in the interior of the Colony is almost painful. Trees, rivers, and plains are all exactly the same for hundreds of miles, and everything about the rivers, after getting away from the Great Dividing Range and well into the interior, is different from what one would expect from a knowledge of the rivers of any other great drainage system; and the difference is, as I said before, that here the rivers have neither made nor modified the country.

The subject is so full of interest that I have already extended this paper far beyond the limits first assigned, and must now conclude in the hope that at some future time I may have an opportunity of adding something more valuable to the notes made in my recent journey.

These notes have been put together at Mr. Russell's request, for the purpose of placing on record anything in them that may be of value; but I am quite sure that what I have been able to collect is only a small part of the mass of valuable information which is in the hands of the squatters and their managers. The men who are engaged in the practical work of colonizing do not as a rule possess the kind of general scientific knowledge which would enable them to see the relation of the facts in their possession to each other; and if they did, the facts are scattered in so many hands that the first and most important work must be to collect and place them on record.

Since writing this paper I received from Mr. John Todd, who was lately residing at the Cato, near Brewarrina, an account of some wells and springs on a station which he held in South Australia, not far from the coast. The information is of so much importance, and seems to bear so directly on the question at issue, that I give it in Mr. Todd's own words:—

"Regarding the information you asked me for. The station that I had in South Australia was distant about 25 miles from Guichen Bay and a little further from Rivoli Bay. There was a coast range, then beyond the country was of a flat nature. One part is known as the Biscuit Flat, so called from the surface being strewn with thin cakes in every way resembling biscuits, which when burnt make good strong lime. On this flat country several strong springs exist, which when opened up keep a constant supply of water for stock. Then, on the coast side of the range there are also strong springs, in two of which the water comes bubbling up about 2 feet high, which shows there must be a

strong underground current. On the flat country we used to dig out waterholes, so that the stock could water at them. They would be from 10 to 12 feet deep, sometimes less where the ground was of a stony character. I have seen fish from 4 to 7 inches long come into them. They had eyes, but did not appear able to see, as they did not try to escape. They were tasteless to eat and shaped very much like an eel.

"On another part of the run there was a low-lying range. About the middle of this I took out a waterhole, and into this one came leeches—the same kind as doctors use. The hole had no communication with any swamps."

Astronomy of the Australian Aborigines.

By the Rev. Peter MacPherson, M.A.

[*Read before the Royal Society of N.S.W., 6 July, 1881.*]

It is not my purpose merely to give a list of aboriginal names of stars and constellations. Looking over the materials to hand, and setting forth the astronomical knowledge possessed by aborigines of Australia, I have tried to find points of interest to which special attention might be directed. Are there traces of systematic arrangements of the stars? There are, indeed, evidences of imagination in tracing resemblances between objects on the earth and the outline formed by certain stars. Thus we have the Northern Crown forming the curve of a boomerang; a group of stars in the Lion (as it appears to me) exhibiting the shape of an eagle's claw; the Crow, as a kangaroo; the Coal-sack, as the body of an emu; the stars composing the Dolphin, as a great fish; and the streams of stars in Berenice's Hair, as a tree with three principal branches.

But there are more important materials than these to consider. As to the literature of the subject, the most valuable paper on aboriginal astronomy which I have been able to find is one read by Mr. W. E. Stanbridge, before the Philosophical Institute of Victoria, as far back as the 30th September, 1857. It is published in the second volume of Transactions of the Institute, at pages 137-40. The information contained in it was obtained from a tribe called the Boorong, who dwelt about Lake Tyrill, in the Mallee country in the west of Victoria. The more important systematic arrangements regarding the stars, as indicated in the paper, will be briefly stated, as introductory to other systematic arrangements of an astronomical character, which are not stated by Mr. Stanbridge, but which can nevertheless be gathered from materials he has supplied. We learn that a mythological connection was made between certain stars and the seasons of the year. Thus, the Pleiades (*Larnankurrk*) are a group of young females playing to a corroboree party of young men (*Kulkunbulla*), represented by the belt and dirk of Orion. The red star Aldebaran, *Gellarlec*, or rose-crested Cockatoo, is an old man keeping time to the dancers. This as a summer group corresponds well with the beautiful moonlight nights of November and December, when the air is balmy, and the signs in the heavens are the resplendent groups of Orion and the Pleiades, with such

individual bright stars as Sirius and Aldebaran. As the year advances we come to the Twins, who are two hunters, *Yurree* and *Wanjel*. These pursue and kill Capella, which in the aboriginal mythology is called *Purra*, and represents a kangaroo. The mirage is the smoke of the fire at which Purra is cooked by the successful hunters. The corroboree party and the hunting party fitly enough form two groups to set forth the period of summer, and the arrangement has a poetical character about it. Moreover, as an isolated point, the breaking up of a prolonged drought is thus set forth: Berenice's Hair, which is in the meridian at midnight in the month of March, is a tree with three principal branches. Now, although a shower of rain has come, the dusty and gaping earth has soaked up every drop of water that has fallen upon it. A small cavity, however, formed at the junction of the three branches of a tree retains some of the precious fluid, and here a number of birds are represented as drinking, and the scene is transferred from the earth to the skies.

The winter also has its ruling stars. These are Arcturus and Vega. Arcturus is known by the name *Marpeankurrk*, and is held in great respect for having taught aborigines where to find pupa of the wood-ant, which during August and September forms an important article of food. Vega in Australian mythology is *Neilloan*, or the Mallee-hen, elevated to the rank of a goddess. She too is held in much esteem for having taught them how to find eggs of the Mallee-hen, which also form an important element of food during October. Here then are two representative stars, corresponding with the two representative groups of stars which fitted to the summer-time. The guiding ideas in one case are the corroboree and the kangaroo hunt; in the other case, the discovery of pupa of the wood-ant and eggs of the Mallee-hen.

As to the south polar region, we might almost expect that such a conspicuous group as the Southern Cross would figure in aboriginal legends. In their oral literature the Cross is a tree which affords safety to *Bunya* (the Opossum) that was pursued by *Tchingal* (the Emu). The story goes that he in fear left his weapons at the foot of the tree, and was changed into an Opossum for his cowardice. Tchingal appears to be the impersonation of evil, and is identified with the Coal-sack. The figure of this dark space somewhat resembles the rough outline of the body of an emu, and hence it would seem that the dusky figure of the emu is accepted as the impersonation of evil. The Pointers are two great warriors who spear and kill Tchingal, and their spears stick into the tree at the two points represented by the two nearest stars, one in an arm, the other in the foot of the Cross. Aboriginal theology seems specially connected with the south polar region and the Southern Cross. The magnificent star Canopus is called War, or the Crow, which occupies a most distinguished

place in aboriginal legends. Canopus is the male, and the small red star No. 966 in King Charles' Oak, the female Crow. Strangely enough the Crow represents the benefactor of the aboriginal race. He is the Prometheus, the fire-bringer, whose good deeds are celebrated in fire-legends over the greatest part of Australia.

Having got something like systematic arrangements, the question occurred whether other arrangements might be discoverable from the materials Mr. Stanbridge supplied, though they were not pointed out by him. Thus we find that Arcturus (Marpean-kurrk) is the mother of Antares, which the Boorong people called Djuit. Then again, Vega (Neilloan) is the mother of *Totyarguil* (Atair) in Aquila. Moreover, two small stars placed closely together near the head of Capricornus represent the fingers of an uncle of Totyarguil. This warrior had been killed by Bunyips in the water, but his remains were rescued by his uncle, whose name was *Collenbitchik*. The two little stars are his fingers feeling for the shore. Thus mythological associations connect Arcturus and Antares as one; and Vega, Aquila, and the small stars near the head of Capricornus as another family group.

With these materials we can determine the principle on which a systematic grouping has been made. Three stars near each other, and in a line or nearly so, form a starting-point. Hence we have the three stars in Orion's belt, the three in the Scorpion, with Antares in the middle, and the three in Aquila. All are brought into service. These three triads of stars are of such a character as to strike the eye at once. They stand out in a very marked manner from all the stars about them. Those who accustom themselves to observe the stars become familiar with these triads, and could distinguish any of them at once, supposing the whole of the sky beside should be clouded. The three stars in Orion are the most regular in size and position. Of the three stars in the Eagle group, the one in the middle is by far the largest; and of the Scorpion group, the one in the middle is not only the largest but it is also the red star Antares, the rival of the planet Mars, which sometimes comes in the vicinity of it. But besides the smaller groups of three, there are plainly the larger groups of three. Each triad indicated consisting of stars near together, becomes, as a whole, a starting-point to be associated with other points to form a new linear group on a larger scale. Hence we have Orion's belt, Aldebaran, and the Pleiades forming a much longer line across the heavens. The triad of stars in the Scorpion becomes a starting-point from which a line is prolonged to Arcturus. A similar arrangement prevails in regard to the triad in Aquila. The line is prolonged to the two stars near the head of Capricornus in one direction, and to the brilliant star Vega in another. Thus the triadic arrangement is fully carried out in three out of four groups.

The arrangement in regard to Totyarguil is not injured by his boomerang being sent out of line to occupy the curve of the Northern Crown. Moreover, only two points are given in the group connecting the Scorpion group and Arcturus. Now it happens that Mr. Stanbridge mentions two small stars in the end of the Scorpion's tail, *Karik Karik* (Falcons). These with Antares and Arcturus would make a line corresponding closely with the line of which the Aquila group forms the centre. The two small stars near the head of Capricornus bear a close analogy to the two small stars in the end of the Scorpion's tail. Mr. Stanbridge, however, though he mentions the stars as Karik Karik, does not mention any mythological circumstance connecting them with Antares and Arcturus. The principle of grouping thus developed will explain why some bright stars are not named amongst those given in Mr. Stanbridge's paper. Such bright stars as Procyon, Spica Virginis, Regulus, and Fomalhaut are not mentioned: they are isolated stars, though bright—they do not readily fall in with any mechanical grouping of stars.

Moreover, the aboriginal astronomers who constructed the system we are unfolding were content with three points in a line. This is very noticeable in the case of the group embracing Orion's belt, Aldebaran, and the Pleiades. Those engaged in making out this mechanical arrangement could scarcely have failed to notice that Sirius, in all its splendour, would have formed a fourth point in a line stretching from the Pleiades, yet it is not included in the scheme. Sirius and Rigel are connected as the male and female eagle (*Warepil*), respectively, as if to put Sirius out of association with the group of dancers and musicians. The straight line joining three points was the one object sought by the star-gazers of the Mallee Scrub. No indications of triangles or squares exist. The four stars, Scheat, Alpherat, Algeneb, and Markab, form a tolerably good square, but it is not introduced into the system. Though very conspicuous, the stars are not even named. This is the more to be noticed because they occur in that part of the heavens where no linear arrangement exists to suit the ideas of aboriginal astronomers.

The important points not noticed by Mr. Stanbridge, but discoverable from the materials he has supplied, are :—

1. A systematic grouping on the basis of linear arrangement.
2. Four linear groupings are tolerably parallel to each other.
3. All are tolerably parallel to the horizon as they make their appearance in the evening sky in their several seasons, in south latitude, about 36°, which is that of the Mallee Scrub about Lake Tyrill, in Victoria.

Here there is an ingenious utilitarian scheme of the stars. I have seen various attempts made to group these bodies in a mechanical manner, so as to assist observers in acquiring facility

in distinguishing the different stars, but I do not remember any of them so successful as this. Necessity is the mother of invention, and no doubt the circumstances of aboriginal Herschels of the Mallee Scrub contributed to their success in the matter.

The name *Aquila* is perhaps preserved in the aboriginal name,

TOTYARGUIL.

Let us follow a different line of inquiry. Glancing over the aboriginal combination of astronomy and mythology, we find that early occupants of Australia acted much in the same way as the early inhabitants of Europe and Asia. Heroes and heroines have been translated from the earth to the skies. If in other lands the Lion and the Bear and other animals have been elevated to the heavens, we find that Australian aborigines have also done as much for the kangaroo, the opossum, and other Australian quadrupeds. When we come to birds, we find the eagle, the crow, and other birds fixed in the mythological skies by inhabitants of Asia and Europe, and by those of Australia. Reptiles and fishes have been honored also by them ; nor has the vegetable kingdom failed to supply a tree to match the Oak of King Charles. The question occurs, whether anything can be made from a careful scrutiny of the materials thus generally brought before our notice. In the Greek mythology the Pleiades formed a group of young ladies, who were the daughters of Atlantis. In the Australian mythology, the same group appears as a group of dusky damsels, as we have seen, playing to the band of men in Orion going through the evolutions of the corroboree. This we learn in Mr. Stanbridge's paper. From works of the late Rev. W. Ridley we learn that in other parts of Australia, as on the east coast, and inland near the Barwon, the Pleiades are also represented as a group of young damsels. In the old Greek mythology the faint Pleiad, Merope, is obscure compared with the others, because she married a mere mortal, while her sisters wedded divine personages. In Australian mythology the same Pleiad is represented as being ashamed, and hiding behind the rest on account of her defective appearance. All this is worthy of note, but without some other points of identification it would be needless to set down the similarity between the two mythologies as evidence that one was derived from the other, or that both were derived from some older source. To liken a glittering group of stars to an assemblage of young damsels is a suggestion which would quickly occur to those concerned in making out resemblances and analogies. Even the special notice of the less brilliant Merope is so near the surface of observation that it would be unsafe to found much upon it. These coincidences, however, should be

noticed, as in the course of further investigation other circumstances may come to light which would invest them with new value and importance.

The cluster of stars belonging to the Dolphin occurs in Mallee astronomy as the Great Fish. But here again, as the outline of the group is not unlike that of a fish, the resemblance might easily be noticed by independent observers. We have seen that eagles and crows, as well as other birds, have been elevated to the skies. Unfortunately, however, the aborigines have sent up so many eagles and crows, that the probabilities in favour of identification are lessened thereby. Sirius and Rigel are male and female eagles. Altair and Vega (according to Mr. Ridley) are both eagles, and the Northern Crown is their nest. One of the Twins appears also to be an eagle. As regards identification, the Crow of celestial maps is replaced by the Kangaroo of Australian mythology. The bright star Altair or Atair, in the constellation Aquila, occurs as an eagle in the astronomical notices collected by Mr. Ridley. Here then is eagle for eagle. Unfortunately, however, the value of this identification is seriously weakened by the consideration that, as we have seen, a number of other very bright stars have been chosen to represent eagles. At any point, then, can we make anything out of the names? Our inquiry now will bring us into contact with philology, with which, however, it is our purpose to deal only in so far as it comes before us. That the roots of some aboriginal words are the same as those of the languages of Asia and Europe has often struck observers. Collins and Mundy, Miles, Hull, and Bennett, as also the Reverends Threlkeld, Ridley, and Taplin, may be mentioned as having pointed out words bearing close resemblance, in meaning and stem-letters, to words in Asiatic and European languages. As regards our present purpose, some ground exists for believing that the name *Totyarguil* not only refers to an eagle, but also contains, in the latter part, *arguil*, the same root as the Latin *aquila* itself. Let us then examine the name Totyarguil, the aboriginal name of the star Atair, in Aquila. That it applies to the bright star of the group rather than to the group itself need not stop our progress. The particular often expands into the general, and conversely, the general often concretes into the particular. Moreover, the fact exists that Ptolemy applies the name eagle (*aetos*) to the bright star itself.

The first part of the word—Toty—is easily discovered in the vocabularies to be an abbreviated form of the word *tourte*, which means a star. Totyarguil, then, means the star Arguil. The word *tourte* reminds us of the Greek *teras–teratos*, a wonder, a sign, a heavenly sign. There is also the plural epic form, *teirea*, signs—heavenly constellations. On the shield of Achilles, made by Vulcan, the poet tells us, "The earth and sky and sea, . . . and all the stars (*teirea*) with which heaven is crowned," were represented.—(Iliad,

B. xviii, 484–7.) The root is wide-spread, being found in the Persian, Zend, and Sanscrit of Asia; in the Gothic, with its numerous modern descendants in Europe; in the Latin, with its numerous descendants; in the Greek, and in the Armoric branch of the Celtic language.

It may be here noticed that the sibilant, the letter s, is almost wholly wanting in aboriginal dialects. Now, although it occurs in so many roots, the Sanscrit and the Greek supply forms which dispense with it. At the same time those forms appear to be accepted as of the same root with the forms referred to which possess the sibilant. In Sanscrit, we have *staras* (pl.) and *tara*, star; in Greek, *teras* and *teirea*, as well as *aster* and *astron*. The peculiarities which appear in lists of aboriginal words for eagle and birds of that description are all in accordance with the well-known principles of comparative grammar. The letters g, k, with c and q, as also with the aspirate forms gh, &c., all belong to one class of letters, and are interchangeable. The Latin *aquila* becomes *aguila* in Spanish, *aigle* in French, and *eagle* in English. In aboriginal lists it will be noticed that stem-letters, represented by kl, gl, cl, are found in words along the eastern side of Australia, from Cape York to Victoria, and even to Oyster Bay in the south-east of Tasmania. There is one word of special interest; it is the word *Coolapatamba*. This is the aboriginal name of Mount Cairncross, in New England. The meaning of it has been preserved by Lieutenant Breton ("Excursions in New South Wales, &c.," p. 245; London, 1833.) It means, "Where the *eagle* drinks," and it is as poetic as it is stately. It will be noticed also that the part *Coola* agrees closely with the forms *Couel*, *Kawool*, and *Kowool*, the words for eagle in localities in the same general district in which Mt. Cairncross is situated. The presence of the letter *r* in *Arguil* requires to be noticed. It is most easily introduced into places to which it does not belong. Thus in aboriginal words for crow, we have such spellings as *wah*, *wau*, as well as *war*. Now although these are no doubt imitative of the croak of the bird itself, the vibratory letter has found its way into some of the forms. In other forms for the name eagle, we find this same peculiarity with regard to the letter *r*. Thus there is waa-pil, an eagle, and also war-pil an eagle. It will be noticed, of course, that there are other forms in gl, &c., the stem-letters of aquila, in which no r occurs. As to the various forms beginning with ul, wl, bl, pl, ml, the first two of these indicate the mere difference between English and Continental spelling. Thus the *Ualce* of Bishop Salvado is obviously the same as the *Woljar* of Sir George Grey. We have an *r* in the one which is not in the other. The word *Woljar* is not unlike *Vulture*, and it means a vulture. As to the other forms, they arise from the well-known variations which characterize the labials: p aspirated becomes

ph = f; b aspirated becomes bh = v; the form in m is the appropriate nasal to the labial class, as may be seen in Bopp's Comparative Grammar. Looking down the column of aboriginal words for eagle and some of the birds of the same class, it is very noticeable how persistent is the root in the various forms bl, pl, wl, ml. Accretions occur prefixed to the root, and also accretions suffixed, but the root strikes deep through all.

The dropping of the initial stem-letter in a number of the forms requires to be noticed. An inspection of the rows of words given from the vocabularies of aboriginal words leaves no doubt that it is the same root which is perpetuated through the series, though with many modifications. The chief modification is the dropping of the initial stem-letter represented by g, k, q, or c; but this is a well known phenomenon in languages examined and compared by philologists. Thus, when a dental and a labial come together the initial dental sometimes disappears. *Duellum* or *dvellum*, losing the *d* becomes *bellum*. Again, a guttural and a liquid may come together and we find the guttural dropped. In the case of *kmelan*, black, we have two forms, *kelainos*, and *melan*, in which latter case the initial guttural is dropped. We are also familiar with such peculiarities as in *guerre* of the French being *war* in English, *gwin* of the Welsh being the *vinum* of the Latin. In these cases the guttural at the beginning disappears and is replaced by a letter of the labial class. In English itself we have the guttural in *guard* disappearing before the labial *w* in *ward*. As to the two forms, the longer and the shorter, the one with and the other without the guttural at the beginning, it is only proper to point out that they are both represented in the languages of Europe and Asia. The Latin *aquila*, with its modern Spanish representative *aguila*, closely resembles the *agal*-eg of Cape York, the *wali* of the Malay and Arabic languages, the *willo* of South Australia.

The aboriginal name *Totyarguil*, with modifications, seems to reappear both in South Australia and Tasmania. In the former of these Colonies we find the word *Wiltutti*, meaning *a season* of the year. Now, if *Totyarguil* means *star-eagle*, it would seem pretty plain that *Wiltutti* exhibits the same roots with the order reversed. Another South Australian form is *Willutti*, which means *spring*. This agrees with the twofold division between the summer group and the winter group, the eagle group belonging to the latter. Again, the vocabulary of Messrs. Teichelmann and Schürmann gives the word *Willo* as meaning an eagle, and *Wilto* as both a star and an eagle. This last appears to be a mere contraction of *Wiltutti*, the season of the year in which the star—the eagle—is a ruling sign in the heavens. These associations seem to fix *Totyarquil* and *Wiltutti* as really the same name. The occurrence in South Australia of the name Wiltutti, which

appears to be compounded of the same roots as Totyarquil, is not very wonderful, considering that the Mallee country extends far into South Australia. The occurrence of the word Weelaty in the south-east of Tasmania is more noticeable. This word means an eagle, and readily takes its place with the South Australian words Wiltutti, a season of the year, and Wilto, which means both a star and an eagle, and presents so much of the appearance of being a mere contraction of Wiltutti. The materials under review seem to show that the root of the aboriginal word for eagle is the same as that of the Latin aquila. We have seen that it is no mere isolated root; it is wide-spread over the whole of Australia, being found in dialects in Queensland, New South Wales, Victoria, Tasmania, South Australia, and Western Australia. The only portion in which the root does not occur is the north-west—a territory, however, in regard to which the vocabularies are few. In the meantime, at least, the root may take its place with such others as have been pointed out from time to time, and some future inquirer, on a wider basis of induction, may be in a position to decide how far such words are mere coincidences, or how far they prove that the ancestors of the aborigines were one with those whose descendants have spread over Asia and Europe. In conclusion, I desire to say that the region called the Mallee Scrub was visited some time ago by a special representative of the Melbourne *Argus*. He describes the portion which belongs to Victoria as a triangle, whose sides are about 200 miles in length. The area is about 13,000,000 of acres, and occupies about one-fifth of the whole area of the Colony. No river runs through it, and the places marked as lakes are often dry. There are sand-hills some of which rise as high as 250 feet. These are called "Pine Rises," as sometimes a few specimens of Murray pine trees grow upon them. Otherwise the country is occupied by the Mallee Scrub, which is summarily called the *Eucalyptus dumosa*, although other species, as the *E. oleosa* and *E. socialis*, are also found. The average height of the trees is about 12 feet, while the maximum is 25. The monotony of such a country is as bewildering as an expanse of open ocean. This was a suitable region for the cultivation of a knowledge of the stars. The mechanical grouping which we have considered accords well with the circumstances of the people. Mr. Stanbridge mentions that they claimed to be better acquainted with the stars than any other tribe. The materials preserved, which we have been investigating, seem pretty fairly to establish this claim.

European and Asiatic words for *eagle*, *hawk*, &c.

(1.) With stem letters of *Aquila*.

Aquila	Q L	eagle, Latin.
Aguila...........	G L	eagle, Spanish.
Aigle	G L	eagle, French.
Eagle	G L	eagle, English.

(2.) Dropping the initial guttural.

(Aq-)uila Wali	W L	eagle, Malay, &c.

Australian words for *eagle*.

(1.) With same stem letters as *Aquila*.

Agal-eg	G L	eagle, Cape York.
Gooal-anghta...	G L	eagle, Tasmania.
Couel	C L	eagle, Wilson River, N.S.W.
Kawool	K L	eagle, Manning River, N.S.W.
Coola-patamba	C L	"where the eagle drinks," Mount Cairncross, N.S.W.
Klu-roong	K L	hawk, Victoria.
Keeil-gur	K L	hawk, Western Australia.
Pun-*gyl*	G L	eagle, Victoria.
Pittie-*kil*-kadie	K L	hawk, South Australia.

(2.) Dropping the initial guttural.

(Ka)-wool *Ual*-ce, *Ual*-cia	U L	eagle, Western Australia.
Wil-lo	W L	eagle, Adelaide.
Wil-to	W L	star, eagle, Adelaide.
Wil-tutti	W L	season of year, Adelaide.
Wil-lutti.........	W L	spring, Adelaide.
Weel-aty.........	W L	eagle, Tasmania.
Wol-jar	W L	vulture, Western Australia.
Bil-yarra	B L	eagle, Darling River.
Dib-*bil*....................	B L	eagle, Brisbane River.
Wer-*bill*	B L	eagle, Murray River.
Pul-tyak.........	P L	eagle, Manning River.
Pal-onga.........	P L	hawk, Kamilaroi.
Pirr-*pil*	P L	eagle, West of Victoria.
War-*pil*	P L	eagle, Richardson River, Victoria.
Waa-*pil*	P L	eagle, Loddon River, Victoria.
Mil-kieworie ...	M L	hawk, South Australia.
Mul-urah	M L	hawk, Western Australia.
Mal-yal	M L	eagle, New South Wales.
Mul-lion.........	M L	eagle, Kamilaroi.
Mul-len	M L	eagle, Wagga Wagga, N.S.W.
Mul-len, *Mul*-len	M L	hawk, Victoria.
Jam-*mul*, Jam-*mul*	M L	hawk, Port Jackson.

The authorities for the foregoing Australian words are:—Collins, Breton (Lieut.), Mitchell (Sir T. L.), Stokes (Capt.), Teichelmann and Schürmann (Revs.), Grey (Sir G.), Salvado (Bishop), M'Gillivray, Milligan, Ridley (Rev.), R. Brough Smyth, and Dawson, together with some manuscript vocabularies.

The Spectrum and Appearance of the recent Comet.

By H. C. RUSSELL, B.A., F.R.A.S.

[*Read before the Royal Society of N.S.W., 6 July, 1881.*]

I SAW the comet first on the evening of May 25th. It was then a conspicuous object with the naked eye, and with the aid of a binocular glass I traced the tail twelve degrees. With the 11½-inch refractor the nucleus was very well defined; it appeared a little oval in shape, the longer axis being coincident with the direction of the tail. There was a slight coma in front of it. The diameter of the nucleus was four seconds of arc.

From May 25th to June 2nd cloudy weather prevented observations, except just a glimpse on the 2nd, when I saw it between the clouds. The coma had very much increased in front of the nucleus. The morning of June 5th was fine, a still greater increase in the coma was visible, the greater part of it in front of the nucleus, but a large shoot or tail-like part extended from the following side and then turned to the tail. (See Drawing A.) The evening of the 5th was also fine, and as I looked at the comet it passed over a small star, ninth magnitude, some of the brighter parts of the coma going over it without stopping any of its light, so far as I could see. This star with others in the tail are shown in Drawing B. At 6h. 15m. 5s. p.m., S.M.T., the star and comet had the same declination, and the distance from centre to centre, measured with the filar micrometer, was only twenty-one seconds of arc. At the same time three very small stars were shining through the tail with no apparent loss of light. Drawing B was made at this time, and a good set of measures with another small star was obtained. It was remarkable the change in the coma which seemed to have taken place since the morning, but from its subsequent appearance I think it must have been our atmosphere that prevented me from seeing as much of the coma in the evening of the 5th as I did in the morning.

On the morning of June 6th I obtained a good set of measures of the comet and a seven magnitude star, and on the evening of the same day, there being no good star for observation, I determined to test the comet with the spectroscope; but before doing so drawing C was made, to show the rapid change that was going on in the coma. This was the only time that there seemed to be any dark shadow behind the nucleus, and I may mention that the

general colour of the comet seemed to be greenish, except the nucleus, which was of a decided yellow, almost orange colour. The spectroscope I used was by Browning, and capable of clearly dividing the D lines, and the measures were made by means of a micrometer. While working at the comet I was unable to use artificial light, and therefore adopted the method of making the lines disappear behind a bar in the field of view, with very satisfactory results. For the purpose of securing the exact positions of the bright lines, I turned the telescope to the moon then shining and measured the nearest Fraunhafer lines while the micrometer was in the same position as it was when used for the comet.

Turning the telescope so that the slit of the spectroscope received light from the tail of the comet, I found it was too faint to give a visible spectrum, and I could not see any until parts near the head were brought upon the slit, when three bright lines became visible. Getting nearer the nucleus a faint continuous spectrum was visible, crossed by three bright lines, but in the faint grey continuous spectrum I could not see any dark lines. The three lines were not sharply defined, but were sufficiently so to admit of good measures to the centre of each. The middle line was by far the brightest; the next in brilliance was in the yellow, and the third and faintest was in the violet. The whole of this spectrum increased in brightness as the slit approached the nucleus, but when the nucleus itself was on the slit all the additional light seemed concentrated in the middle of the B line until it shone almost like a star, and quite as bright as the nucleus itself, proving that its light is monochromatic. Even in the brighest part of the comet I was unable to see any dark lines in the continuous spectrum. I think the reason was its faintness, for when I have examined the solar spectrum reflected from paper in a room I have obtained a similar continuous spectrum without dark lines.

As to the cause of such a spectrum in the comet, there seems no reason to doubt that at least part of it is caused by reflected sunlight; but our atmosphere or gases in the state familiar to us would not reflect so much light as the comet does, and it seems probable that highly heated solid matter must give some of it. The solar heat at that distance from the comet is by no means sufficient to raise solid matter to a state of incandescence such as the bright lines prove the gas to be in. To account for the observed facts several theories have been put forward. One is that the light is due to electricity caused by the friction of the matter of the comet within itself during its violent agitation as it approaches the sun, and that this shines as luminous discharge. Another is that it is due to chemical action set up as the comet approaches the sun. In support of this it may be said that meteors burning as they approach our earth give spectra with bright metallic lines which seems to indicate

that they have matter in an oxidizable shape, and it may be that the comets as they approach the sun find conditions existing which cause a violent chemical action on their surfaces. The subject is a difficult one, but whatever be the active cause we know that it is very energetic, because we can see its effects from day to day, and the changes going on take place on the side nearest the sun.

I took two sets of measures of the lines on the evening of June 6th; for the first a low power was used on the reading telescope, and two measures of each line were taken with the micrometer. The means of these gave for A line the wave length 558·0; for B, 513·5; for C, 467·3. A higher power was then used: the mean of two measures of A gave 558·1; for B, three measures gave 512·4. By this time the comet had got so low that I could not see the line C. The measures, considering the position of the comet, and the difficulty of getting them at all during the short time between daylight and the comet's setting, are very satisfactory.

In the standard works of reference the information about cometary spectra is very meagre. I was therefore very glad to receive in May a very valuable work on the spectra of comets, and similar carbon spectra, by Dr. B. Hasselberg, of St. Petersburg; the work was published in 1880, and gives a tabular statement of the spectra of comets up to 1879. Taking the twelve comets there recorded, the mean wave length for A is 556·4; for B, 512·7; and for C, 470·6. I may mention that C is the most difficult to measure of the three lines. In the earlier comets the values given are higher than the later ones; the last three, 1877 to 1879, give a mean of 468·0, the extreme values for A are 559·0 to 553·8; for B, 511·0 to 513·8; and for C, 475·0 to 467·2.

There are carbon lines at 558·2—513·9 and 467·5.

Lines.	A.	B.	C.
Wave lengths.			
Mean of twelve comets......	556·4	512·7	470·6
Recent comet..................	558·1	513·0	467·3
Carbon lines	558·2	513·9	467·5

Searching for a terrestrial substance that would give a spectrum like that of comets, Dr. Huggins found that some of the hydrocarbons came nearest to it, and he early called attention to the fact that some meteors contain hydrocarbons, and the possible link thus established between the two bodies. Since then the investigation has advanced another step. On the 12th of February, 1875, a meteor having been seen to fall at Iowa, U.S.A., was found before it was cold, and it occurred to Professor A. W. Wright to examine it for occluded gases, with the object of seeing whether they were the same in this meteorite, which was of the stony kind, as in others principally composed of metals. He found that it contained nearly

four times its bulk of gas, which could be driven out by heat, at temperatures under 200°; 93 to 95 per cent. of this gas was carbonic acid and carbonic oxide; at higher temperatures hydrogen predominated, as it does in metallic meteors. When examined with the spectroscope these gases gave a brilliant spectrum, in which the carbon lines quite eclipsed those of hydrogen, the brightest being three lines in the green, which Professor Wright says are precisely the same as the comet lines. In the extract from his paper on this subject which I have seen in the Reports of the British Association the wave lengths are not given, so that we are unable to see if they have exactly the same position as the average of all the measures of comets, for the different comets have given slightly different values of these lines. We may, however, take it as proven that the spectrum of the gases yielded by some meteors is coincident with the comet spectrum; and this is the strongest evidence that the substance is the same in both cases, and therefore probably derived from the same source. If in addition to this we bear in mind that some comets travel in meteor orbits, we see that there is very good reason for the supposition which is now generally accepted, that they have had a common origin. What that may have been is yet to be proven; at present several theories are put forward. One makes meteors the fragments of a shattered comet, for all are angular pieces which seem to have been broken off; another makes comets all gas, of such a character as could not be converted into stone or metal. Another makes all the phenomena of meteors and comets in accordance with the nebular hypothesis, according to which, matter coming out of original chaos arranges itself, in obedience to the law of gravitation, about centres of attraction, the heavier parts forming the body of the planet and the lighter ones the atmosphere, and these together having motion round the grand centre of attraction the sun; and that in the vastness of interplanetary space, some matter was so far removed from the attraction of the larger planetary centres, that it obeyed the smaller and nearer centres, forming miniature worlds revolving round the sun, so light and so far from the sun that they were disturbed by the attraction of every passing body, and were thus finally thrown into highly elliptical orbits. Being thus derived from the original nebula, we should expect to find the solid and the gaseous parts similar to those in the earth, and of course alike in meteor and comet.

Those who have studied meteors under the microscope find evidence of original crystalline forms which could only have come into existence during long periods of rest. In one that I have examined these seem to have been broken into pieces and subsequently cemented together to form part of a meteor, which in itself bears evidence of having been broken from some larger mass. This cementing together seems to have been done at a temperature

sufficient to keep iron in a fluid state, for it is distributed through the mass of the meteor as if it were the cement.

But I will not detain you with these speculations, which open such a wide field of investigation. I hope I have said enough to indicate the direction in which the investigation is proceeding, and the importance of testing with the spectroscope another member of the meteor-comet system.

On June 7 the weather was again cloudy, and I only caught a glimpse of the comet between clouds, and obtained the sketch D, which shows a remarkable change in the coma. I then put on a direct vision spectroscope, and got a glimpse of a continuous spectrum with three bright lines and a decided shade of red at the red end of the spectrum, but before I could obtain any measures it was gone, and I did not get another opportunity of testing the spectrum.

The morning of the 8th was cloudy, but the evening fine, and I got another good set of measures; thence to the 14th the weather prevented observations. On that morning I saw the comet when above the clouds, and tried to follow it into the sunlight, but lost it about 15 minutes before the sun rose; there was too much daylight to permit of star observations.

Before concluding these notes I would like to direct your attention to the extraordinary changes that went on in the appearance of the comet. When I first saw it, the nucleus was well defined, and had a small coma in front of it. Eight days afterwards, on June 2, the coma had increased very much, and spread out like a fan before the nucleus, the greater part of it being turned to the following side. On the morning of June 5 a still greater change had taken place; the bulk of the coma was turned like a Prince of Wales feather to the preceding side, the extremity being turned towards the tail, and a second branch on the following side was turned almost directly to the tail. (See Drawing A.) It seemed as if in the interval from June 2 to 5 the coma had divided into two branches, one turning to the preceding, and the other to the following side; and it presented all the characteristics of something which had been shot out of the nucleus, and carried far in front by its velocity, and then turned gracefully back to form part of the tail.

On the evening of June 5 the coma was not so striking. It still presented two branches, but neither developed to the same extent as when seen in the morning; the difference was I think due to the state of our atmosphere, which prevented me from seeing clearly.

On the evening of June 6th I had a fine view of it, and this was the only occasion in which there seemed to be a shadow or dark cone in the rear of the nucleus. The coma was more conspicuous than ever, and presented the appearance of a bird with

outstretched wings in front of the nucleus; and the branch first

Please insert enclosed Drawings of Comet of 1881 after page 86 in Journal Royal Society for 1881, Vol. XV.

CORRIGENDUM for Vol. XV.

Page 90, last line. After June 8, *insert* June 11

[illegible] wings in front of the nucleus; and the branch first

northern hemisphere, and its orbit has been computed by several astronomers.

... in front of the nucleus; and the branch ...

On Comet II, 1881.

By John Tebbutt, F.R.A.S.

[*Read before the Royal Society of N.S.W., 7 September, 1881.*]

I submitted to the Astronomical Section of the Royal Society, at their last meeting (August 5), an approximate determination of the orbit of the Comet which visited us in May and June last. That determination was founded on the observations made at my observatory on May 22, June 1 and 11, but, owing to the limited time at my disposal previous to the meeting, I was unable to reduce the residuals for the middle place within the limits of errors of observation. The elements thus arrived at confirmed my previous statements in the daily papers that our late visitor could not be either the second comet of 1819 or the great comet of 1861, and at the same time pointed to the probability that it was identical with the great comet of 1807. I have now much pleasure in presenting to the General Monthly Meeting of the Society more accurate elements than those referred to. They were forwarded some time ago to the Royal Astronomical Society and to Professor Krüger, of Kiel, and will, I believe, represent within a few seconds of arc all the observations taken in the southern hemisphere. In juxtaposition with them I have presented for comparison Bessel's elements of the great comet of 1807, the longitudes in both systems being referred to the mean equinox of 1881·0.

	Comet II, 1881.	Comet, 1807.
	d.	d.
Perihelion passage, G.M.T...	1881, June 16·30995	1807, Sept. 18·75
Longitude of perihelion	264° 56′ 15″·5	271° 57′
Longitude of ascending node	270 54 0·2	267 49
Inclination of orbit	63 27 14·0	63 10
Perihelion distance	0·7357075	0·6461
Motion	Direct	Direct

But the recent fine comet is not the only one which has been suspected to be a return of the great comet of 1807. On the 16th December last a comet was discovered by Pechüle at the Observatory of Copenhagen. It was observed for some time in the northern hemisphere, and its orbit has been computed by several astronomers.

From these calculations I have selected the following, by Herr Ambronn, of Hamburg, as it is based on the longest series of observations :—

	d.	
Perihelion passage	1880, Nov. 9·5320, Berlin M.T.	
Longitude of perihelion	262° 30′ 9″	M. Equinox, 1881·0.
Longitude of ascending node ...	249 35 36	M. Equinox, 1881·0.
Inclination of orbit	60 41 5	
Perihelion distance	0·67406	
Motion	Direct	

Dr. Holetschek, of the Vienna Observatory, and Mr. S. C. Chandler, of Boston, U.S., have both pointed out the general resemblance of these elements to those of the comet of 1807.

From the elements which I have given of our late visitor, it appears that it was, on the evening of discovery, May 22, distant 82,000,000 miles from the sun, and 71,000,000 from the earth. At my last observation, namely, on the morning of June 12, these distances had diminished to 69,000,000 and 33,000,000 of miles respectively. The comet passed through perihelion at 26 minutes past 7 o'clock in the evening of June 16, Greenwich time, and at 20 minutes past noon on June 19, it reached the plane of the earth's orbit at the ascending node. Now it is a remarkable circumstance, as I pointed out indeed in the previous paper, that the earth at the time of the nodal passage was not far from the prolongation of the axis of the comet's tail. Had the comet been delayed 2·75 days in coming to the line of nodes, the earth would have been exactly in a line with the sun and the comet, and the comet would of course have been projected on the sun's disc, as seen from our planet. It does not, however, appear at all probable that had the earth and comet been in the line of nodes at the same time, the earth would have been involved in the matter of the tail. On the 1st June I could just trace the tail as far as a small star, whose distance I measured from the nucleus by means of an ordinary sextant. The resulting length of the tail was 8° 38′, and, adopting my elements before given, this would correspond to a real length of 8,000,000 of miles. Supposing the earth and comet to have been in the line of nodes, the distance between the two bodies would have been 26,000,000 of miles, the comet being that distance within the earth's orbit. It appears, therefore, that the visible part of the tail would not reach the earth by 18,000,000 of miles. Doubtless the diffused matter of the tail extended considerably further from the nucleus than it could be actually seen, but I do not think it at all probable that any portion of it could have reached the terrestrial orbit. Another interesting circumstance in connection with the late comet is its

near approach to the orbit of Venus. The planet itself, however, had passed the point of near approach about seventeen days before the comet arrived at it. Had the two bodies arrived at the point together, the elements of the comet's orbit would have been considerably changed by the excessive attraction of the planet.

In conclusion, I may mention that No. 2377 of the *Astronomische Nachrichten*, the latest date to hand, contains Dr. Gould's announcement by telegraph to Europe of the comet's appearance. The telegram is dated 1st June, and identifies the comet with that of 1807.

I now add the results of my observations of the comet. They will prove useful to any computer who may be desirous hereafter of investigating a definitive orbit from a combination of all the observations in both hemispheres. The differential measures on the morning of June 12th depend simply on the circles of the equatorial, and are therefore only approximate; all the other measures were taken with an excellent filar micrometer. They are corrected for refraction. The positions depending on Lacaille's stars must be regarded as provisional only, as these stars will have to be re-observed in the meridian at the close of the year. The second term in each co-ordinate of the comet is the reduction to the earth's centre, π denoting the equatorial horizontal parallax of the comet in seconds of arc.

Windsor Mean Time. 1881.		Comet—Star.		Comet's Apparent		No. of Measures	Comp. Star.
		R. A.	N. P. D.	R. A.	N. P. D.		
d.	h. m. s.	m. s.	′ ″	h. m. s. s.	° ′ ″ ″		
May 22	6 56 24	− 1 46·60	+ 1 2·0	4 58 20·90 + 0·0684 π	125 39 54·9 + 0·444 π	8	1
„ 23	7 1 17	− 3 16·04	+ 1 58·4	4 58 52·38 + 0·0680 π	125 13 45·0 + 0·464 π	7	2
„ 23	7 35 26	... ...	+ 1 53·8	... ...	125 13 2·8 + 0·535 π	8	3
„ 23	7 39 19	+ 2 18·38	... ...	4 58 52·60 + 0·0667 π	... ...	2	3
„ 25	7 3 37	+ 4 8·03	− 7 2·3	4 59 48·23 + 0·0671 π	124 13 16·7 + 0·488 π	7	4
„ 27	18 9 44	−10 54·96	+ 7 11·2	5 1 3·46 − 0·0656 π	122 45 53·7 + 0·520 π	1	5
June 1	6 22 4	+ 0 28·45	− 2 45·8	5 3 27·15 + 0·0636 π	119 5 16·5 + 0·478 π	12	6
„ 2	6 42 37	−28 32·00	+ 4 22·6	5 4 2·86 + 0·0627 π	118 0 55·7 + 0·524 π	1	7
„ 4	6 46 24	− 6 30·30	+ 5 3·4	5 5 13·65 + 0·0610 π	115 32 55·9 + 0·548 π	3	8
„ 5	6 25 42	− 2 16·13	+ 1 18·6	5 5 53·74 + 0·0608 π	114 7 40·5 + 0·527 π	5	9
„ 6	6 14 30	+ 6 7·49	+ 0 35·6	5 6 33·29 + 0·0602 π	112 32 31·3 + 0·519 π	5	10
„ 6	6 14 30	+ 1 50·59	... ...	5 6 33·22 + 0·0602 π	... ...	5	11
„ 8	6 12 59	− 0 11·72	+ 4 33·7	5 8 0·91 + 0·0586 π	108 46 24·4 + 0·536 π	5	12
....	18 27 36	+ 2 18·11	+87 26·2	5 11 8·08 − 0·0556 π	99 47 52·1 + 0·519 π	3	13

MEAN PLACES of the Stars of Comparison for 1881·0, and Apparent Places for the Dates of Observation.

Star.	R. A. Mean.	R. A. App.	N. P. D. Mean.	N. P. D. App.	Authority for Star's Mean Place.
	h. m. s.	s.	° ′ ″	″	
1	5 0 7·62	7·50	125 38 49·1	52·9	Wash. Gen. Cat. 1860 + Wash. Obs. 1875 + Cape Cat. 1860. / 3
2	5 2 8·52	8·42	125 11 42·9	46·6	Lacaille's Cat. 1750, No. 1722.
3	4 56 34·32	34·22	125 11 5·9	9·0	Lacaille's Cat. 1750, No. 1685.
4	4 55 40·27	40·20	124 20 16·6	19·0	Lacaille's Cat. 1750, No. 1681.
5	5 11 58·40	58·42	122 38 39·0	42·5	Lacaille's Cat. 1750, No. 1785.]
6	5 2 58·53	58·70	119 8 1·0	2·3	Wash. Gen. Cat. 1860, No. 2173.
7	5 32 34·62	34·86	117 56 28·9	33·1	Wash. Gen. Cat. 1860, No. 2342
8	5 11 43·63	43·95	115 27 51·0	52·5	Wash. Gen. Cat. 1860, No. 2217.
9	5 8 9·50	9·87	114 6 21·0	21·9	Wash. Mural Circle Zone, 156, 1848, No. 11.
10	5 0 25·36	25·80	112 31 56·0	55·7	Nautical Almanac, 1881.
11	5 4 42·20	42·63	....	...	Annales de l'Obs. Royal de Bruxelles, Cat. 1874, No. 116.
12	5 8 12·07	12·63	108 41 50·4	50·7	Oeltzen Argelander, S., No. 3773.
13	5 8 49·11	49·97	98 20 26·1	25·9	Nautical Almanac, 1881.

The mean places of stars Nos. 2, 3, 4, 5, 9 and 12 have been brought up by the Catalogue precessions to the mean dates between the epochs of the respective catalogues and 1881. The precessions have then been recalculated from Peter's elements, and employed in bringing up the places from the epochs of the catalogues to 1881·0. Proper motion from the B.A.. Catalogue has been applied to the places of Nos. 1 and 7.

Windsor, Aug. 27, 1881.

New Double Stars, and Measures of some of those found by Sir John Herschel.

By H. C. Russell, B.A., F.R.A.S., Government Astronomer.

[*Read before the Royal Society of N.S.W., 7 September, 1881.*]

The study of double stars is, I think, one of the most fascinating which astronomy gives to us. The great number and variety of the objects already known, and the certainty that many new ones will be the reward of any diligent search for them, keep up the interest to such an extent that the observer needs no other incentive to his work. M. Flammarion, after an examination of the observations already made—and be it remembered that this branch of astronomy may be said to have been originated by Sir William Herschel, about the year 1800—finds that there are 11,000 double and multiple stars catalogued. Of these, 819 give certain indication of relative movement; of which 731 are double, 73 triple, 12 quadruples, 2 quintuples, 1 sextuple; of these again, 518 seem to form orbital systems, and 316 are only united by celestial perspective. Observation further shows that the components of an orbital system may be separated by as much as 22″, and two stars separated by 15′ of arc may have a common proper motion. Again, Mr. Doberck, after a critical examination of double stars, considers that orbits of only twenty-seven are known, and of these only seven are in the Southern Hemisphere. We know five stars whose period is under fifty years; seven with periods from 50 to 100 years; six between 100 and 200 years; six between 200 and 350 years; three over 400 years. If, in addition to these statistics, we bear in mind that the Southern Hemisphere is only in part explored, and that in the Northern Hemisphere, which has been examined over and over again with fine instruments, used by such observers as Sir William Herschel, Struve, and others, it has been recently shown to be possible, with moderate or small telescopes and good eyes, to find many new and difficult objects, as Mr. Burnham has done, I think you will see that there is justification for the opinion which I have just expressed, and that the observer, in watching these objects for changes, and then in the investigation of them to see whether they are due to the motion of one star round the other, to independent motion of the stars, or to the annual motion of the earth, has his interest constantly maintained; and it is not lessened by the fact that he may go on thus for years making

observations which seem to prove that there is orbital motion, only to find in the end that the changes he sees are due to independent motion, as I endeavoured to show you last year in reference to *p* Eridani, in the supposed orbit of which, as the observations accumulated, the ellipse had gradually to be increased, until in the end the most probable curve, if I may so express myself, was shown to be a straight line, or, in other words, the motion which was supposed to prove it a binary is found to be probably due to proper and not orbital motion at all. I may mention in passing, that if subsequent observation confirms this, the southern binaries referred to by Mr. Doberck will be reduced to six.

Before proceeding to give you some of the results of my own work on our southern double stars, it will be necessary to spend a few moments in describing the instruments and methods of observation. The first instrument with which the work was begun is a very fine $7\frac{1}{4}$-inch refractor by Merz, of 10 ft. 4 in. focal length, and very fine defining power; upon this is a position circle micrometer by the same maker, with $4\frac{1}{2}$ in. position circle, and means of dark and bright wire illumination, and magnifying powers up to 580. For easy stars a power of 159, and for more difficult ones 330 was used; and the method of observing was, first to place the position wire so that it bisected both stars, and then to bisect each of the stars with one of the parallel wires. After which circle and micrometer were read. The wires were then crossed and the circle thrown out of position, and again the wires were brought to bisect the stars as before, and circle and micrometer again read. Hence two independent determinations of the angle, and two readings for the distance, the difference of which gives twice the angular difference between the stars. In reducing these, the two readings of the micrometer were in some cases compared with the coincidence of wires reading to get two measures; at other times the difference between the readings divided by 2 was taken. The result was the same whichever way it was taken. As the latter involved the smaller amount of computation, it has generally been adopted. In many cases ten readings of the micrometer were taken, that is, ten measures of angle and ten of distance; but in the majority of cases only six have been taken. When the stars are very close, the method of setting the wires to the apparent distance of the stars has been frequently adopted, and found more satisfactory than the other method. In a few instances the distance has been obtained by placing one of the wires between the stars, and from its known diameter and its relation to the distance of the centres, estimating the distance.

The other telescope, used since 1874, is a very fine $11\frac{1}{2}$-inch objective, $12\frac{1}{2}$-ft. focus, by Schröder, with position circle micrometer by the same maker. The illumination of wires (bright) is

obtained by four prisms placed near them, and the light from a small gas flame reflected into the side of the telescope. The magnifying powers are from 100 to 1,500, the power 800 being used for all difficult objects. The same method of observation as used with the Merz instrument has been continued with the 11½-inch. Since 1879 the 7¼-inch telescope has been set up in the north dome, and has been used by Mr. Hargrave in measuring Herschel's stars and verifying the positions of new stars.

About 746 of Herschel's stars have been remeasured, some of them many times over, and 350 new double stars have been found. The results are appended, representing in this small compass some 15,000 measures of angle and distance.

For the sake of completeness I have included, in the general list, the few stars mentioned in my paper read before the Society last year.

With regard to other matters affecting the observations, I may mention that both the domes are made of thin brass, and the temperature is always very nearly the same inside as it is outside; hence the work could be begun as soon as the shutters were opened. It has been my practice to observe stars on the meridian, or very near to it, and always taking the R.A. by means of the instrument, the hour circle readings show the distance from the meridian when the observations were finished. In some instances bright stars have been measured during the day-time, but generally the aperture has been reduced to get rid of the excessive light of bright stars.

In entering the notes at the time of observation, a diagram showing the estimated distance and angle has been made in almost every case.

A few words about the list of 350 new double stars, which I have the honor to present to the Society to-night. They cannot be said to be the fruits of a search for new stars, for except an evening now and then devoted to that work, and some time recently given to it at my request by Mr. Hargrave, my object has been to re-examine Sir John Herschel's Cape list between 34° south and the pole. It would have been very easy to double the number even under these circumstances, if I had adopted the same limit of distance as Sir John Herschel; but I was anxious to avoid burdening the list in that way, and made my limit much smaller, and was always more anxious to record close pairs than wide ones. Nine of the new ones are under one second of arc*—several of them very difficult. Sixty-six are under five seconds, others under twenty-five seconds, and all of them are between the parallel 42° south and the pole, with one exception, which was found in the field of view with one of h.'s stars. As they are so far south

* In 2102 stars Herschel has only 25 of 1″ and under.

they are out of the reach of northern observers, and, so far as I can learn from published lists, they are new; but hereafter, when the work of several double star observers in the southern hemisphere is published, it may be that some will be found in other lists.

Many of them are very close and otherwise interesting doubles; and there is every probability, seeing that h. overlooked them when in close proximity to stars that he observed, that some of them will prove to be binaries.

Only a few of them have as yet been repeatedly measured, but of these several show signs of motion. One at 12h. 4m. 60° 21′ was found in April, 1873, and then the measured angle was 212·35°, in May, 1880, it was 209·55°; at first the distance was 4·33″, last year it was 3·87″, showing a change of 3° in angle and 0·46″ in distance. Another at 15h. 50m., and dec. 65° 37′ in July 31, 1872, angle 134° 12, dist., 2·43″; on July 21, 1880, angle 131° 19′, distance 1·91″, again showing a change of 3° and 0·52″. Another very difficult pair at 10h. 45m., dec. 58° 38′ found in March, 1874, angle 256°, distance ½ a second, and in March, 1880, angle 258·81°, distance 1·15″; this one I have mentioned in the paper on double stars last year, but place it here for completeness.

Another star at 13° 0m. 59·14°, found in April, 1880, gives some indication of increasing distance, which, when first measured, was 0·33″, and when last seen was 0·70″.

Amongst the h. stars observed are all those which are or have been supposed to be in motion; of these *p* or 6 Eridani is one of the most interesting; orbits have several times been computed for it, and I found that my earlier observations required a considerable extension of the period, but the later ones demanded more still; in fact, a straight line accords better with all the observations made subsequent to Herschel's than any ellipse, and it would appear that the changes are due simply to proper motion; of this I think there cannot be any doubt; and it would appear from the meridian observations made at the Cape and Madras that it is the preceding star which is in motion, not the following one—h.'s and Dunlop's observations will not plot into the straight line, but it must be remembered that Dunlop had a very imperfect telescope and only guessed the distance; and h.'s angle does agree, the distance only being too little—a fault the possibility of which no one would have more readily admitted than h. himself. (See diagram.)

Alpha Centauri. It will be seen from the observations that periastron did not take place as predicted, in March, 1875, but in March, 1878, three years after. A great many measures of this binary will be found in the catalogue. At present the distance is increasing rapidly. (See diagrams showing plot of Sydney Observations.)

Some of h.'s stars present considerable difficulty, and are probably in motion, as for instance 4786 γ Lupi, an easy double in 1836 is now a single star, with the highest powers on the large equatorial. The motion is evidently slow, and it is remarkable that Herschel says of this star, "Cleanly divided with power 480 and the black division well seen, well separated with power 800"; and of π Lupi he says, "I do not think measures of this star will be got with this instrument." "Excessively difficult. It is closer than γ Lupi, for the discs are smaller, and yet are not so much divided." Now I found π Lupi quite an easy object, and the mean of my measures make the distance 0·73″, while Herschel made it 0·67″, so that there has been no great change in this star. But γ Lupi, which h. found so easy, I have examined a great many times and always failed to divide it even with the greatest powers on the large refractor.

Another star of the same character it would seem is h. 4854. h. classes this as "very difficult to be verified." On June 4, 1872, at the end of my evening's work, I looked at it and divided it easily with power 230; I only took one measure, making the angle 46° 25′, and the distance 1·75″, being satisfied that in this case, as in many others, that what was very difficult in Herschel's reflector was very easy in the Sydney refractor. By some chance I did not look at this star again until June 17, 1874, and to my surprise I could not divide it with any power. On July 16, 1880, I carefully examined it with the large telescope, and found only a round disc with all powers; so that we have here another interesting double in which the character of the motion has yet to be determined.

But it would take too long to go over all the cases of real or supposed change, and I have therefore collected them into a list, giving only bare measures, more details being found in the catalogue of stars measured. In all there are twenty-two stars which either give satisfactory indications of motion or have at some time been supposed to be in motion.

I have added another list of seventeen interesting objects, being such double stars as have been found in the same field of view as stars which Herschel measured, and which therefore we are justified in assuming that he looked at without discovering their character. Of these no doubt some must be set down as too difficult for the reflector; three, h. 3370, 4935, and 5078, have the large star double, but there are several instances in which the only satisfactory explanation is that the stars have changed since he looked at them. Perhaps the most striking case is 4909, where he was struck with the beauty of the group, and went on to describe it particularly, and he left out what is now one of its most striking features—a star within the pentagon, quite as bright as three of the stars he mentions. His descriptions of such things are as a rule so accurate that I am convinced the additional star has

K

appeared since Herschel looked at the object. As another case I may mention h. 4890, which he is careful to say "is in a vacancy in the Milky Way, which is here entirely free of ground stars," yet only 11s. following 4890; in fact, where h. must have seen it if then visible, I find a beautiful double star, magnitudes 11 and 11, and in a field of 80s. diameter sixteen other stars, and the telescope then (1871) used was 7¼, while h. used the large reflector. There are others in the list of the same character, but I must pass on to notice changes in the magnitudes of some of the double stars. One is rather curious. In December, 1834, Herschel observed No. 3972 in his list, and called the magnitudes 8½ and 8½; on March 7th, 1836, he looked again and called them 9½ and 11; next night he verified this, making them 10 and 11. In 1834 he saw a 13 magnitude star which made an obtuse and nearly isosceles triangle with the other two, and he subsequently remarks it must have been ill seen (in 1836), as is evident by the magnitudes assigned, and from the fact that the 13 magnitude was invisible. When in 1873 I examined this, the magnitudes were 10½ and 12, and I could not see the little star; it would seem therefore that they must have been brighter in 1834. The night in 1873 was not favourable, but h. 4130 was examined at the same time, and the magnitude then assigned 8–10, or the same as h.'s.

There are many stars in the Cape list that cannot be found. Over some of these I have spent a good deal of time to see if they were cases of fading stars or change of position; the result has not been satisfactory in most of the cases traced—they are evidently the result of clerical errors; for instance, entering a star with the wrong R.A. or declination. Probably most of those on the list of missing stars are of this character, but some may have been overlooked from changed magnitudes and other causes. Perhaps the number (forty-six) is not surprising when we consider the difficulty of the work as carried on by Herschel.

I have not given much attention to colours, nor have I carefully compared my estimates of colour with h.'s, but one or two instances have been found of apparent decided change. h. 5193 he says the large star is "very red"; I could not see any red in it in 1873 when I remeasured it.

In several cases I see decided colours where h. mentions none; these will be found in the list attached.

In conclusion, I may say that my object has been to remeasure all h.'s close stars south of 34° south declination. In very many cases considerable differences between h.'s observations with the reflector and mine have been found; but a complete list of them has not been made, because the reflector observations so often differ from those h. made with his equatorial that it did not appear to be worth while.

Instances of change—real or supposed (23 stars).

.'s No.	
3407 .... λ Toucani.	h.'s angle 78° 30′ to 80° 51′; R., 80° 12′; probably not in motion.
3423................. K Toucani.	h.'s angle, 17° 50′, dis. 5·78″; R., 0·8° dis. 5·34″.
3453................. p or 6 Eridani.	h.'s angle, 122° 6′, dis. 3·39″; R., 234° 41′, dis. 6·30″; all the later observations plot into a straight line as if the motion were proper, not binary.
3835.................	h.'s angle, 343°, dis. 4″; R., 2° 6′, dis. 2·90″; and 1882 R. 2·35″, angle 11° 39′.
3930.................	h.'s angle, 72° 43′, dis. 3·49″; R., 77° 5′, dis. 2·82°; probably not binary.
4025.................	Triple h.'s angles, 47° 6′ & 34° 8′, dis. 18″ & 40″; magnitudes, 6–14 & 6–12; H. angles, 69° 53′ & 37° 40′.
4106.................	h. 139° 18″; R. 143° 8′.
4373.................	h.'s angle, 226° 1′, dis. 25″; H., 338° 18′, dis. 12·66″.
4507.................	h.'s angle, 227° 4′, dis. 20″; H., 180° 26′, dis. 12·94″.
4521.................	h.'s angle, 119° 48′ to 122° 57′, dis. 4·96″ to 6·62″; R., 117° 27′, dis. 5·34″; motion improbable.
4539................. γ Centauri.	h.'s angle, 346° 47′ to 361° 58′, dis. ⅗ to 1″; R., 1880, angle 1° 16′, dis. 1·39″. Motion doubtful.
4645.................	h.'s angle, 231° 8′; H., 202° 11′, 1881.
4691................. α Centauri.	For complete measures, see list.
4728................. π Lupi.	h.'s angle, 108° 30′ to 115° 35′, dis. 0·67″ to 1·01; R., 1880, 99° 18′, dis. 0·90″. h. said this is closer than γ Lupi. R., with the Sydney refractor, found this an easy object, while γ Lupi is too difficult to divide; one or other must have changed.
4786................. γ Lupi.	h.'s angle, 90° 10′ to 104° 30′, dis. ⅗ to 1″; R., 1880, with power 1,200 seems to be elongated, angle 270° E.; but though I have often tried I never can divide it. See note to π Lupi.
4852.................	h.'s angle, 115°, dis. 6″; H. angle, 145° 8′, dis. 14·66″.
5014.................	h.'s angle, 69°, dis. 0·67″; R., 79° 18′, dis. 0·81; but as h.'s angles range from 61° to 76°, it is probably not binary.
5041.................	h.'s angle, 260° 5′, dis. 2″; R., 1871, 253° 35′, dis. 3·27″; R., 1873, 259° 52′, dis. 3·11″; H., 1880, 264° 52′, dis. 1·82″.
5027.................	h.'s angle, 59° 2′; R., 1871, 84° 42′; H., 1881, 91° 52′; showing change of 25° in thirty-five years, and 7° in ten years.
5078.................	h.'s angle, 313° 4′; H., 212° 50′. Is this a clerical error, 313° for 213° in Cape list?
5084................. γ Cor. Aust.	h.'s angle, 37° 6′, dis. 1·23″; R. angle, 53° 8′, dis. 1·15″.
5246.................	h.'s angle, 116° 8′, dis. 1½″; R. angle, 129°, dis. 3·82″.
5258................. θ Indi.	h.'s angle, 307° 31′, dis. 3·65″; R. angle, 288° 50′, dis. 4·68″.

(17 objects.)

Instances in which h. must have looked at double stars, if they were then double, without seeing them.

h.'s No.	
3370	Large star, double, R. No. 3.
3464	In same field with this is a small triangle of stars—the preceding one of which is a close double not seen by h., R. No. 11.
3499	Another double, precedes this only 15ˢ, R. No. 16.
3843	Another wide double in the field north following this, not seen by h.
3959	Another north, and only 12ˢ following, R. No. 74.
4077	Another double in the field with this, R. No. 82.
4122	Another a little south and in same field, R. No. 86.
4645	Two pairs in the field with this, R. Nos. 238 & 239.
4787	Two doubles in field with this, R. Nos. 265 & 266.
4835	Another double, 6ˢ following this, R. No. 273.
4890	Another double in field, 11ˢ following, and 16 other stars. h. says, "This is in a vacancy of the Milky Way, which is here entirely free from ground stars." R. No. 285.
4909	h. says, "This is a very symmetrical little constellation, of two large and three of 12 magnitude, forming a pentagon in a direction at right angles to the two large stars at its base." On 22 July, 1872, I found a small star very conspicuous within this pentagon, and adding much to its beauty. h. would certainly have mentioned it if seen. R. 289.
4935	Large star, double, R. No. 298.
5075	h. says nearest star is distant 15′; R. finds nearest is one of a pretty triangle; seems strange h. did not say so.
5078	Large star is double, R. No. 317.
5256	Another double in field with this, R. No. 328; and another precedes 65ˢ and 15′ north.
5292	Another double precedes this 60ˢ, R. No. 336.

List of 46 h. stars looked for and not found.

h's No.	
3366	
3393	
3397	
3530	Could not see either.
3577	
3590	
3648	
3678	

List of 46 h. stars looked for and not found—*continued.*

h.'s No.	
3719	
3748	Same as 3641.
3790	
3837	
3851	
3870	
3872	
3884	
3895	
3979	
4030	And 4038 probably same.
4085	
4130	And 4142 probably same.
4390	
4480	
4504	
4544	
4596	h.'s decln. 65° 10′ pair at 64° 10′.
4628	No companion.
4695	
4707	
4840	Probably same 4836.
4854	Single star now.
4858	
4906	
4959	
4975	
4979	Looked for several times.
4996	
4998	
5006	
5008	
5103	
5234	
5267	
5319	
5385	
5437	

Instances of change in magnitude or colour.

h.'s No.	
3419	h. does not mention colour; R. sees greenish yellow and copper red.
3962	h. calls magnitudes 8 and 10; R. several times 8 and $8\frac{1}{2}$.
3972	h. calls magnitudes $8\frac{1}{2}$ and $8\frac{1}{2}$, 24 December, 1834, and $9\frac{1}{2}$ and 11 on 7 March, 1836, and 10 and 11, 8 March, 1836; R., 1873, $10\frac{1}{2}$ and 12; h. makes the remark, "A 13 mag. star—makes an obtuse angle and nearly isosceles triangle with these two; it does not appear to have been noticed in either of the other observations, in which the stars must have been ill seen, as is evident by the magnitudes affixed"; but then R., 1873, made them $10\frac{1}{2}$ and 12 (?) variable.
3977	h. 8–9 now 9–13.
4104a	h. white and blue; R. yellow and blue.
4104b	h. no colour; R. yellow and white.
4539 γ Centauri.	h. examined this star four times,—on three it was badly defined; I have examined it three times, and twice it was badly defined. Can there be any peculiarity about the star?
4813	h. does not mention colour; R. sees yellow and blue.
4890	h. says, "This pair of 8 and 9 magnitudes is in a vacancy of the Milky Way which is here entirely free of ground stars"; and on 13 July, 1871, when I looked at it with $7\frac{1}{4}$-inch telescope I found a pretty double star of 10 and 11 magnitudes, only 11″ following h's. star, and in a field 80s. in diameter; I counted twenty stars from 9 mag. downwards, *i.e.*, two double and sixteen other stars.
5193	h. says large star very red; R. cannot see it red at all.
5292	h. mag. $7\frac{1}{2}$–10; R. 10–11 (?) change.

Errors in Cape Catalogue.

h.'s No.	
3748 3641	No star at 5h. 13m., but there is at 4h. 13m., and this star is numbered 3641.
4030 4038	Probably same star.
4130 4142	Probably same star.
4272	R. A. 6m. too large. Should be 9h. 48m.
4596	h.'s declination is 65° 7′; star is at 64° 16′.
4684	Cannot find a double here.
4836 4840	Probably same star.
5132	Angle of position 160° in error.
5235 5245	Probably same star.
5327	Angle of position 180° in error.

In the Cape catalogue Sir John Herschel used "h" as the symbol for himself. I have adopted the same letter for him in the following catalogue. R. is used for myself, and H. for Mr. Hargrave.

A diagram of the positions of *p* Eridani is given, and another showing the Sydney observations of *a* Centauri, also a number of smaller ones showing the interesting triple or multiple stars amongst those of the Cape catalogue which have been measured, and similar diagrams for some of the new ones.

The value of a revolution of the screw of each of the micrometers has been carefully determined in the usual way, *i.e.*, by separating the wires ten or more revolutions and observing the transits of circumpolar stars; that of the 11½-inch is 18·006″, and that of the 7¼-inch is 21·670″.

It has been the custom always to make the measures with the star as close to the meridian as possible, and the star's hour angle at the time the observations were finished has been recorded in every case, and can be referred to if necessary. All the observations prior to July, 1874, were made with the 7¼-inch, and all the observations since that date which are marked H. have been made with the same instrument, and all those marked R. since the date given above were made with the 11½-inch.

The date given in each of the catalogues is the date of the observation; to many of the new stars the date of discovery is added. A table showing the value of the decimal date is given at the end.

H. C. RUSSELL.

Sydney Observatory,
24 March, 1882.

Double Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′		″	
1	8	10	71	5442	R.	..	0 2	78 12	60e	..	..	..
2	7	1	79	3349	..	H.	0 5	68 0	106 8	8	17·11	8
3	7	1	79	3350	..	H.	0 5	58 9	174 56	8	4·72	8
4	8	1	79	3352	..	H.	0 5	50 19	310 23	8	6·42	8
5	8	1	79	3354	..	H.	0 9	36 43	148 49	5	17·21	5
6	10	11	70	3358	R.	..	0 10	62 10	......	..	..	..
	30	11	70	,,	R.	..	....	....	......	..	..	..
	25	11	79	,,	..	H.	....	....	......	..	..	..
7	14	12	80	3365	..	H.	0 20	51 27	170 45	6	15·93	6
8	10	10	71	3366	R.	..	0 22	68 24	......	..	..	..
9	26	11	73	3370	R.	..	0 23	66 36	61 56	4	38·03	4
	1	12	79	,,	..	H.	0 23	66 36	62 19	4	38·67	4
	2	12	79	,,	..	H.	0 23	66 39	62 27	10	38·44	10
10	29	10	70	3373 after β Toucani	R.	..	0 26	63 40	169 57	7	27·51	7
11	1	11	70	3374	R.	..	0 27	75 57	117 17	10	31·97	10
12	27	11	79	3375	..	H.	0 28	35 42	165 59	10	5·16	10
13	12	11	73	3388	R.	..	0 37	54 47	238 9	6	16·39	6
14	24	11	70	3393	R.	..	0 38	75 19	......	..	..	..
15	5	12	79	3395	..	H.	0 40	42 41	69 45	10	7·06	10
16	12	11	73	3397	R.	..	0 41	54 46	......	..	..	..
17	2	12	79	3398	..	H.	0 41	52 45	126 24	10	27·20	10
18	5	12	79	3407	..	H.	0 48	70 16	80 12	10	20·72	10
19	24	11	70	3415	R.	..	0 58	41 18	......	..	..	..
	..	..	..	,,	..	..	....	....	......	..	..	..
	28	2	72	,,	R.	..	....	....	140e	..	1e	..
	24	11	75	,,	R.	..	....	....	157e	..	½e	..
	20	11	77	,,	R.	..	....	....	155e	..	1e	..
	13	1	82	,,	..	H.	....	....	141 55	6	0·91	6
20	19	2	72	3416	R.	..	0 59	60 43	......	..	1e	..
	2	12	79	,,	..	H.	0 58	60 49	126 45	10	4·05	10
	29	5	80	,,	R.	..	0 58	60 47	125 38	6	5·43	6
21	20	10	78	After 3419	R.	..	1 3	55 56	239 47	3	6·25	2
	8	10	79	,,	..	H.	1 3	55 56	......	..	..	..
	19	12	79	,,	..	H.	1 3	55 56	245 44	10	5·31	10
22	8	12	79	3421	..	H.	1 8	51 23	62 27	10	45·90	10
23	24	11	70	3423 κ Toucani	R.	..	1 11	69 33	0 11	11	5·00	10
	25	11	72	,,	R.	..	1 10	69 31	359 49	5	5·38	5
	5	12	79	,,	..	H.	1 11	69 39	0 57	10	4·27	10
	29	5	80	,,	R.	..	1 12	69 31	0 24	4	5·64	6
24	19	2	72	3435	R.	..	1 21	60 17	6e	..	..	..
24a	13	2	82	3447	..	H.	1 28	30 7	......	..	..	..
25	15	12	73	3452	R.	..	1 34	54 4	103 9	6	11.10	6
26	2	12	70	After 3453 p Eridani	R.	..	1 35	56 49	242 5	10	5.46	10
	1	3	78	,, ,,	R.	..	,,	,,	236 39	10	6·03	10
	4	3	78	,, ,,	R.	..	,,	,,	236 36	4	5·91	4
	20	3	78	,, ,,	R.	..	,,	,,	237 26	10	6·15	10
	20	10	78	,, ,,	R.	..	,,	,,	235 0	2	6·28	2
	8	12	79	,, ,,	..	H.	....	....	237 17	10	5·44	10
	12	6	80	,, ,,	R.	..	....	....	234 41	10	6·30	10
27	19	11	73	3464	R.	..	1 41	76 51	160 20	6	3.73	
28	1	11	70	3475	R.	..	1 51	60 54	44 39	5	3·31	5
	26	11	70	,,	R.	..	1 51	60 54	40 3	11	2·78	10
29	25	11	70	3488	R.	..	2 9	62 12	137 42	10	5·36	10
	8	12	79	,,	..	H.	....	....	......	..	....	..
	29	12	79	,,	..	H.	2 9	62 19	137 11	9	4·36	1
30	31	12	79	3494	..	H.	2 15	36 1	......	..	....	..

measured at Sydney Observatory.

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
1	....	9 14	....	No. 7 or 8 magnitude star here; only 9 and 14; cannot measure it.
2	159	9 11	....	
3	159	9 10	....	
4	159	8 11	....	
5	159	9 10	....	Very indistinct.
6	....	9 9	....	Not found.
	....	....	....	Not found.
	159	10 10	....	Too ill-defined to measure.
7	159	8 10	....	Cirrus stopped work.
8	150	7 14	....	Looked carefully for companion; could not see it R. No. 3.
9	140	9 10	....	Large star double; night too bad to measure it.
	159	8 9	....	Scud stopped observations.
	159	8 9	....	
10	....	4 4	....	
11	100	9 10	....	Cloudy for a time, cleared after. H.'s position, 112·6; distance, 20″; magnitude, 9·11.
12	159	6 8	....	Bad night.
13	....	7½ 8	....	
14	....	11 12	....	Not found.
15	159	8 9	....	
16	....	7 15	....	Companion not seen.
17	159	8 9	....	
18	150	7 7½	....	
19	320	7 8	....	Found a star; could not divide it; definition good.
	320	....	....	Divided easily with 320 power.
	400	8 9	....	Seen double; not measured.
	200, 400	....	....	Seen double; stars unsteady.
	....	....	....	Night too bad to measure; seen with 150 power.
	333	7 8	....	Three stars of 7 magnitude in field of finder with this.
20	....	....	....	Found, not measured.
	159	8 8	....	
	....	8 8	....	
21	333	3 7	Greenish yellow, copper red.	Position doubtful. H. says nothing about colour.
	159	....	....	Seen, not measured.
	150	....	....	
22	159	8 8	....	
23	320	6 9	....	H.'s second list, positions 17·50 and 14·20; distances 5·78 and 4·24; magnitudes, 5–11, 6–10.
	....	6 9	....	Stars pretty steady; definition middling.
	159	6 9	....	
	300	....	....	A very fine object.
24	....	8 10	....	Seen, not measured.
24a	333	....	....	Not divided with 333 power.
25	....	8 9	....	Ill-defined.
26	230	6 6	....	Rapid motion.
	....	7 7	....	
	175	....	....	Aperture, 8 in. Clouds stopped observations.
	520	6 6½	....	Aperture, 9 in. Stars ill-defined.
	....	7 7	Both yellow	Woodford.
	159	6 6	....	
	....	....	....	
27	....	8 10	....	This is one of three stars forming a triangle.
28	320	7 7	....	Very difficult; bad definition.
	320, 480	....	....	Definition good.
29	....	....	....	Pretty double. Herschel's position, 134° 56′; distances, 4·93″ and 6·28″; magnitudes, 9-9; 2nd list.
	159	....	....	Seen, not measured.
	159	8 8	....	
30	159	9 9	....	Seen elongated; no measure made.

DOUBLE Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′		″	
31	12	11	73	3499..................	R.	..	2 18	60 34	61 25	4	8·35	4
32	30	12	79	3520..................	..	H.	2 35	55 25	203 31	10	20·48	10
33	31	12	79	3525..................	..	H.	2 37	61 5	......	..	....	..
34	31	12	79	3527..................	..	H.	2 39	41 2	......	..	....	..
	9	1	80	,, ...	..	H.	2 39	41 7	43 37	10	1·41	10
35	22	12	73	3530..................	R.	..	2 43	81 16	......	..	....	..
36	29	12	79	3532..................	..	H.	2 44	38 3	146 12	10	5·22	10
37	31	12	79	After 3532............	..	H.	2 44	38 55	......	..	....	..
	13	1	80	,, ...	..	H.	....	....	......	..	....	..
38	22	12	73	3539..................	R.	..	2 49	78 37	45e	..	6e	..
39	30	12	73	3545 θ Eridani	R.	..	2 54	40 47	82 18	5	8·19	5
	10	1	79	,, ,, ...	..	H.	....	....	85 19	10	9·14	10
40	9	1	79	3549..................	..	H.	2 59	38 32	222 30	10	1·94	10
41	26	11	70	1st after 3549	R.	..	3 1	51 49	69 15	10	38·05	10
	30	12	79	,, ,, ...	..	H.	3 1	51 53	69 40	10	39·01	10
42	16	1	72	3556..................	R.	..	3 8	44 52	230e	..	1½e	..
	15	1	79	,, ...	..	H.	3 8	44 58	204 8	10	2·12	10
43	13	1	79	After 3556............	..	H.	3 9	64 22	39 35	10	44·27	10
44	2	1	80	3562..................	..	H.	3 10	64 49	330 26	10	34·22	10
45	28	11	70	After 3567............	R.	..	3 13	64 55	102 38	10	19·35	10
	13	1	79	,, ,, ...	..	H.	3 14	64 53	101 0	10	19·89	10
	16	1	80	,, ,, ...	..	H.	3 13	64 54	104 42	10	19·11	10
46	29	11	70	3568..................	R.	..	3 12	79 28	223 56	10	15·15	10
	10	1	71	,, ...	R.	..	....	....	223 55	10	15·21	10
	31	12	79	,, ...	..	H.	....	....	224 19	10	15·15	10
47	14	1	79	3576..................	..	H.	3 21	46 2	340 24	10	3·03	10
48	3	12	75	3577..................	R.	.	3 19	82 16	......	..	..	..
49	3	12	75	3581..................	R.	..	3 26	80 55	331 59	10	5e	..
50	22	12	73	3582..................	R.	..	3 26	83 58	......	..	..	..
51	30	12	79	1st after 3586	..	H.	3 35	40 52	324 43	10	7·43	10
	13	1	80	,, ...	..	H.	....	....	326 24	10	6·65	10
52	29	12	79	2nd after 3586	..	H.	3 36	60 15	270 0	10	57·79	10
53	2	1	80	3590..................	..	H.	3 41	42 16	......	..	..	..
54	2	1	74	3591..................	R.	..	3 41	51 41	......	..	..	..
55	18	12	72	3592..................	R.	..	3 40	54 43	17 11	10	5·72	10
56	14	1	79	3597 f Eridani	..	H.	3 44	37 59	205 10	10	7·00	10
57	2	1	74	3598..................	R.	..	3 45	50 49	229 45	4	14·22	4
58	6	1	71	3600..................	R.	..	3 46	64 19	15 19	10	23·12	10
	20	1	80	,, ...	..	H.	3 45	64 33	14 59	10	22·00	10
59	6	1	71	3603..................	R.	..	3 45	71 22	79 20	10	19·37	10
	2	1	80	,, ...	..	H.	....	....	81 22	10	19·58	10
60	15	1	79	3605..................	..	H.	3 45	80 35	161 27	10	20·07	10
61	17	1	79	3606..................	..	H.	3 49	71 9	339 22	2	20·03	3
62	28	2	81	3607..................	..	H.	3 46	81 13	124 5	6	36·99	6
63	23	1	79	3609..................	..	H.	3 51	63 0	......	..	..	..
64	23	1	79	3610..................	..	H.	3 52	62 59	......	..	..	..
65	23	1	79	3611..................	..	H.	3 52	40 16	139 4	10	3·90	10
66	17	1	79	3612..................	..	H.	3 50	80 23	158 39	10	20·26	10
	23	1	79	,, ...	..	H.	....	....	161 13	10	20·35	10
67	28	1	79	3618..................	..	H.	3 58	49 50	320 0	10	9·73	10
68	28	1	79	3620..................	..	H.	4 0	44 47	354 1	4	79·96	4
69	28	1	79	3622..................	..	H.	4 0	36 10	109 54	10	10·69	10
70	11	1	71	3624..................	R.	..	4 1	75 5	......	..	..	..
	2	3	81	,, ...	..	H.	....	....	25 46	6	19·74	6
71	2	3	81	3625..................	..	H.	4 6	52 13	180 32	6	11·46	6
72	29	1	79	3627..................	..	H.	4 8	34 4	297 51	10	28 15	10

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
31	....	10 11	....	Another pair precedes this 15 seconds only. R. No. 16.
32	159	8 9	....	
33	159	7	....	7-magnitude star seen; no companion.
34	159	7 7	....	Seen, not measured.
	159	7 7	....	
35	....	8 12	....	Neither of the companions seen; 11-magnitude star follows about 10 seconds.
36	159	6 8	....	
37	159	6	....	6-magnitude star here; no companion.
	159	6	....	6-magnitude star here; no companion.
38	....	10 11	....	Estimated position and distance.
39	....	5 6	Straw-yellow	Definition middling; hazy, thick night.
	159	....	....	
40	159	....	....	
41	....	7 8	....	Herschel's 2nd list. Position, 70·42; distance, 37·31; magnitudes, 7-8; no change.
	159	7 9	....	
42	....	....	....	Seen; bad definition; no measures.
	159	6 11	....	
43	159	6 11	....	
44	159	8 8	....	
45	....	7 9	Yellow	Definition good; large star yellow. Herschel's position, 101·49; distance, 18·09″; magnitudes, 7–9.
	159	7 9	....	
	159	7 9	....	
46	...	7 9	Yellow	Herschel's large list. Position, 224·8; distance, none given; magnitudes, 7–9.
	159	7 9	....	White haze about; small star precedes.
	159	6 8	....	
47	159	7 9	....	
48	....	8 12	....	Companion not seen; night good.
49	....	11 12	....	Distance estimated. This double is the northern corner of a trapezium.
50	....	7 11	....	Seen, but clouds prevented measures.
51	159	8 8½	....	
	159	8 8½	....	
52	159	7 8	....	
53	159	....	....	Not found.
54	....	10 13	....	Seen, too faint to measure.
55	....	6 10	Straw-yellow, sky blue.	Definition bad.
56	159	6 7	....	
57	....	10 11	....	Faint and difficult; verified.
58	....	9 10	....	Well defined.
	159	9 10	....	
59	....	9 10	....	Magnitudes seem too small.
	159	9 10	....	
60	159	9 10	....	
61	159	9 10	....	Very faint.
62	159	9 10	....	
63	159	11 11	....	Seen, too faint to measure.
64	159	10 12	....	Seen, too faint to measure.
65	159	9 9	....	
66	159	8 9	....	Small star, very indistinct.
	159	....	....	
67	159	10 10	....	
68	159	7 8	....	
69	159	9 9	....	
70	....	10 11	....	Bad definition; seen but not measured.
	159	9 10	....	
71	159	10 10	....	
72	159	8 10	....	

DOUBLE Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance
							h. m.	° ′	′			
73	13	1	80	3628	..	H.	4 8	36 35	49 26	10	49·56	10
74	16	1	71	3631	R.	..	4 9	69 16	225 52	10	6·44	10
	29	1	79	,,	..	H.	....	....	225 36	10	7·08	10
75	20	1	80	3634	..	H.	4 11	44 58	340 57	10	10·70	10
76	2	1	74	3641	R.	..	4 15	62 29	270 4	6	8·39	6
	3	2	79	,,	..	H.	....	....	268 59	10	7·82	10
77	3	2	79	3642	..	H.	4 16	34 9	157 25	10	6·39	10
78	3	2	79	3643	..	H.	4 16	44 33	114 6	4	70·34	4
79	30	12	73	3644 θ Reticuli	R.	..	4 19	63 32	6 20	4	5·20	4
80	4	2	80	3648	..	H.	4 20	48 53	......	..	..	..
81	29	1	79	3650	..	H.	4 23	40 46	181 59	10	3·20	10
82	15	12	73	After 3650	R.	..	4 23	57 20	233 8	6	6·92	6
83	30	12	73	3651	R.	..	4 25	64 27	......	..	..	..
	3	2	80	,,	..	H.	....	....	62 15	10	16·95	10
84	30	12	73	3655	R.	..	4 62	64 21	......	..	..	..
85	5	2	80	3656	..	H.	4 23	44 39	72 5	10	17·16	10
86	6	4	81	3657	..	H.	4 24	66 29	339 8	6	7·24	6
87	23	1	80	3662	..	H.	4 28	66 5	60 16	10	18·92	10
88	30	12	73	3665	R.	..	4 32	60 5	40e	..	6e	..
89	16	1	72	3670	R.	..	4 32	63 6	99 18	4	33·00	4
	29	1	80	,,	..	H.	....	....	98 52	10	31·83	10
90	5	2	79	3671	..	H.	4 35	50 22	279 49	10	6·26	10
91	4	2	79	3673	..	H.	4 35	77 55	64 24	10	10·18	10
92	4	2	80	3678	..	H.	4 37	45 14	......	..	..	..
93	4	2	79	3679	..	H.	4 37	62 30	......	..	..	.
93a	21	2	82	3680	..	H.	4 37	52 10	26 38	6	8·28	6
94	5	2	79	3683	R.	..	4 40	59 9	79 6	6	3·46	6
	5	2	79	,,	..	H.	....	....	80 36	10	3·32	10
95	29	1	80	3691	..	H.	4 39	77 10	42 1	10	36·49	10
95a	21	2	82	3694	..	H.	4 46	45 18	65 11	6	8·21	6
96	18	1	73	3696	R.	..	4 44	56 14	278 44	6	3·62	6
97	30	3	81	3697	..	H.	4 47	41 30	281 34	6	12·18	6
98	24	12	72	3702 ι Pictoris	R.	..	4 48	53 37	56 1	6	11·85	5
	3	2	80	,,	..	H.	....	....	58 2	10	11·92	10
99	4	2	80	3715	..	H.	4 56	49 42	110 17	10	9·14	10
100	30	3	81	3717	..	H.	4 58	39 46	198 14	6	10·08	6
101	11	2	80	3719	..	H.	5 0	67 26	......	..	..	..
102	17	2	79	3721	..	H.	5 1	80 51	221 38	10	2·55	10
103	4	4	81	3726	..	H.	5 3	45 50	61 27	6	14·95	6
104	17	2	79	3728	..	H.	5 5	41 23	259 31	10	10·29	10
	4	4	81	,,	..	H.	....	....	258 33	6	8·80	6
105	17	2	79	3729	..	H.	5 5	45 0	229 57	10	10·24	10
106	3	2	80	3733	..	H.	5 8	79 33	......	..	..	..
106a	20	2	82	3734	..	H.	5 8	42 56	196 16	6	10·40	6
107	19	10	78	Rigel's companion	R.	..	5 9	8 21	45e	..	0 25e	..
	20	10	78	,,	R.	..	5 9	8 21	{ 64e 199e	.. ..	}	.. ..
108	5	2	80	3738	..	H.	5 10	55 27	......	..	..	..
109	27	1	78	3739	R.	..	5 11	48 1	103 53	6	3·34	6
110	11	2	80	3740	..	H.	5 11	36 51	286 6	10	23·45	10
111	19	2	79	3743	..	H.	5 13	60 7	......	..	..	..
	5	2	80	,,	..	H.	....	....	129 1	10	4·42	10
111a	20	2	82	3745	..	H.	5 14	54 6	171 57	6	12·69	6
112	18	12	72	3746	R.	..	5 12	72 12	263 29	4	4·88	4
113	18	1	73	3748	R.	..	5 15	62 33	......	..	..	..
114	6	4	81	3756	..	H.	5 17	58 52	165 43	6	17·37	6
115	6	4	81	3760	..	H.	5 22	35 25	223 40	6	7·04	6
116	7	1	78	3761 β Leporis	R.	..	5 23	20 51	282 56	8	2·42	8
	8	1	78	,, ,,	R.	..	5 23	20 51	282 26	2	2·56	2
	26	2	78	,, ,,	R.	..	5 23	20 51	282 32	10	2·74	10

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.		Colours.	Remarks.
73	150	7	7½	....	
74	....	9½	9½	....	
	150	....		....	
75	150	9	9	....	
76	150	6	11	Straw colour	Large star, straw colour; both bright clean stars.
	150	....		....	Same as H. 3748, R.A. of which is 1 hr. too much
77	150	7	10	....	
78	150	5	8	....	
79	....	6	9	....	The pair form the preceding corner of a triangle.
80	150	....		....	Not seen.
81	150	6	9	....	
82	....	8	8½	....	Both yellow.
83	....	9	10	....	Seen; not measured.
	150	9	10	....	
84	....	8	13	....	Seen in field with 3651.
85	150	9	10	....	
86	150	10	11	....	
87	150	8	9	....	
88	....	10	10	....	Nice double; magnitudes, doubtful, owing to haze.
89	....	6	8	Uncertain	Definition bad; thin hazy clouds.
	150	6	9	....	Thin clouds about.
90	150	11	12	....	Very faint.
91	150	8	8	....	
92	150	8	10	....	Not found.
93	150	7		Red	Large red star seen; no companion.
93a	150	10	10	....	
94	....	7	7	....	
	150	....		....	
95	150	9	9	....	
95a	150	8	10	....	Small star blue.
96	....	9½	10½	....	Air clear, passing clouds.
97	435	6	14	....	
98	....	5½	6	Both straw yellow ..	Stars steady.
	150	6	7	....	Cloudy.
99	150	8	9	....	Looked for 3713; could not find it.
00	150	10	11	....	
01	....	....		....	Not found.
02	150	8	9	....	
03	150	10	10	....	
04	150	5	9	....	
	150	6	11	....	
05	150	10	10	....	
06	....	9	9	....	Seen; not measured.
06a	150	10	10	....	Very difficult.
07	600 & 800	9	9	....	When best defined clearly divided; distance not more than ¼″; companion of Rigel. See diagram.
	400, 435, 800.	....		....	
08	150	11	11	....	Seen; not measured.
09	....	9	9	....	Very neat; clouds about.
10	....	7	8	....	
11	150	....		....	Seen; cloudy.
	150	9	10	....	
11a	150	9	11	....	
12	150	8	8	....	Bad definition.
13	....	9	11	....	This star is 3641; near α Reticuli.
14	150	9	11	....	
15	150	6	6½	....	No 11 magnitude star seen; unsteady definition.
16	800	4	11	....	This is Burnham's companion. See diagram.
	....	....		....	Very unsteady; small star; only seen in glimpses.
	800	2½	13	....	Herschel's companion; seen with 150 power.

DOUBLE Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
	28	2	78	3761 β Leporis	R.	..	5 23	20 51	286 49	3	2·72	7
	4	3	78	,,	R.	..	5 23	20 51	283 21	10	2·73	10
117	11	1	71	After 3761	R.	..	5 22	52 26	106 10	6	33·59	5
	29	1	80	,,	..	H.	....	....	106 45	10	38·64	10
118	24	2	79	After 3763	..	H.	5 23	43 27	251 41	10	11·84	10
119	3	2	80	,, 3767	..	H.	5 27	42 33	169 47	10	6·48	10
120	24	12	72	3773	R.	..	5 27	82 25	276 56	3	18·61	3
121	6	2	72	3777	R.	..	5 31	54 59	348 20	2	52·26	2
122	2	1	74	3783	R.	..	5 35	71 0	258 32	4	15·56	4
123	21	2	79	3784	..	H.	5 35	46 9	58 38	10	4·65	10
124	12	2	73	3789	R.	..	5 35	50 18	358 1	4	9·14	4
125	6	2	72	3790	R.	..	5 37	66 58	......	..	..	..
126	2	2	79	3793	..	H.	5 39	48 18	110 10	10	11·42	10
127	23	2	80	3797	..	H.	5 41	46 25	174 48	10	50·01	10
128	24	1	73	3802	R.	..	5 42	55 52	308 28	4	6·98	4
129	30	3	81	3803	..	H.	5 43	44 51	113 35	6	17·67	6
130	8	4	81	3805	..	H.	5 46	43 32	118 44	6	5·57	6
131	8	4	81	3806	..	H.	5 47	39 28	114 44	6	11·81	6
132	30	1	73	3812	R.	..	5 40	59 53	190 20	6	2·43	6
133	23	2	80	3814	..	H.	5 46	74 59	173 39	10	3·21	10
134	27	2	70	3816	..	H.	5 50	47 59	230e	..	..	..
135	6	2	72	3820	R.	..	5 52	60 56	94 45	6	27·00	6
135a	13	3	82	3822	..	H.	5 54	53 21	304 57	6	55·84	6
136	18	1	73	3824	R.	..	5 56	50 23	240e	..	3e	..
136a	2	3	82	3827	..	H.	5 58	41 7	248 14	6	23·17	6
137	27	2	79	3828	..	H.	5 58	53 55	125 15	10	14·15	10
138	10	3	79	3831	..	H.	6 0	41 9	134 19	10	2·56	10
139	14	2	73	After 3834	R.	..	6 1	45 5	230 35	6	3·04	6
140	24	1	73	3835	R.	..	6 1	48 25	2 6	6	2·90	6
	9	3	82	,,	R.	..	....	....	11 39	10	2·35	10
141	8	4	81	3836	..	H.	6 4	49 52	302 11	6	9·06	6
142	27	2	74	3837	R.	..	6 4	55 57	......	..	..	..
143	20	1	72	3843	R.	..	6 10	60 20	326 25	6	11·20	6
	19	2	74	,,	R.	..	....	....	326 34	4	11·89	4
144	23	2	80	3846	..	H.	6 12	49 3	......	..	..	..
145	12	1	71	After 3847	R.	..	6 14	65 23	115 24	10	21·13	10
	20	1	72	,,	R.	..	....	....	116 5	6	20·59	6
	11	3	79	,,	..	H.	....	....	116 47	10	20·52	10
146	29	1	73	3848	R.	..	6 14	47 4	139 8	4	5·72	4
	6	3	79	,,	..	H.	6 14	47 4	138 8	10	5·60	10
147	13	3	79	3849	..	H.	6 16	39 20	51 52	10	39·83	10
148	19	2	74	3851	R.	..	6 17	61 34	......	..	..	..
149	12	3	70	3852	..	H.	6 17	44 44	......	..	..	..
150	17	3	80	3854	..	H.	6 18	54 27	......	..	..	..
151	17	2	73	3855	R.	..	6 14	74 28	79 54	5	8·93	5
152	16	3	80	3856	..	H.	6 20	45 40	2 2	10	40·52	10
153	11	3	79	3857	..	H.	6 20	36 39	260e	..	....	..
154	6	3	73	3860	..	H.	6 22	40 54	226 53	10	7·86	10
155	19	2	74	3861	R.	..	6 23	58 7	62 32	4	3·21	4
156	17	3	79	3870	..	H.	6 28	75 3	......	..	....	..
157	8	3	80	3822	..	H.	6 30	79 55	......	..	....	..
158	15	3	80	3873	..	H.	6 30	57 31	......	..	....	..
159	12	3	79	3874	..	H.	6 31	58 39	......	..	....	..
160	6	3	79	3879	..	H.	6 33	70 32	89 40	10	12·48	10
161	20	1	72	3883	R.	..	6 35	48 10	319 18	6	12·99	6
162	14	3	72	3884	R.	..	6 35	55 15	......	..	....	..
	27	2	74	,,	R.	..	....	....	......	..	....	..
	24	2	76	,,	R.	..	....	....	......	..	....	..
	10	3	79	,,	..	H.	....	....	......	..	....	..
163	10	3	79	After 3884	..	H.	6 38	38 17	277 49	10	8·03	10
164	7	2	72	3888	R.	..	6 36	78 49	114 4	2	36·02	2
165	28	12	75	Sirius	R.	..	6 40	16 33	54 53	5	11·71	

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
	800	9 9	....	Aperture 7 in. Observer's feet south instead of north.
	800	....	....	Aperture 8 in. ; definition fair.
117	....	8 8	....	Definition bad ; thin clouds.
	150	7 7	....	
118	150	9 10	....	
119	150	8 8½	....	
120	....	9½ 10	Blue	Small star, very faint.
121	150	6 9	....	
122	....	9 11	....	Difficult, owing to white haze.
123	150	7 10	....	
124	....	9 9½	....	Very little difference in magnitude.
125	....	....	....	Not found.
126	150	7 11	....	
127	150	8 9	....	Very bad night.
128	....	9 11	....	Very faint.
129	150	7 9	....	
130	150	10 11	....	
131	150	11 11	....	
132	....	9½ 9½	....	Definition good at times, then bad again.
133	150	10 10	....	Clouds about.
134	150	6 13	....	Seen ; won't bear light to measure.
135	150	7 12	....	Stars pretty steady ; definition moderate.
135a	150	6 7	....	h.'s small star not seen.
136	....	6 9	....	Seen, but ill-defined ; no measures taken.
136a	150	9 9	....	
137	150	9 10	....	
138	150	9 9	....	
139	150	6 10	Both yellow	Very bad definition.
140	....	7 7	....	
	800	7 7	....	Beautiful pair ; h's angle 343·5°.
141	150	10 10	....	
142	....	....	....	Not found ; definition fair.
143	150	9 9½	....	
	....	10 10½	....	
144	150	9 10	....	Seen ; not measured.
145	....	6 8	....	
	150	7 8	....	
	150	7 9	....	
146	....	10 10	....	Definition bad ; hazy.
	150	10 10	....	
147	150	7 9	....	
148	....	....	....	Not found.
149	150	9 11	....	Seen ; not measured.
150	150	9 12	....	Seen ; not measured.
151	....	10 10½	....	Nearly alike ; definition middling.
152	150	7 11	....	
153	150	7 13	....	Seen ; won't bear light.
154	150	7 10	....	
155	....	9 9	....	
156	150	....	....	Not found.
157	150	....	....	Not found.
158	150	9 11	....	Seen ; not measured.
159	150	6 12	....	Seen ; not measured.
160	150	10 10	....	
161	150	6½ 9	Yellow, pale blue ..	
162	....	7 12	....	Small star not seen ; another red star follows.
	....	....	Red	Red star carefully examined ; no companion seen.
	120,200	7	Red	Red star seen ; no companion found ; 10 in. aperture.
	150	....	....	Not found.
163	150	7 9	....	
164	....	7 12	Yellow	
165	400	1 10	....	Definition good.

Double Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
	17	2	76	Sirius	R.	..	6 40	16 33	54 47	7	11·54	7
	7	3	76	„	R.	..	„	„	55 14	6	10·37	6
	5	4	76	„	R.	..	„	„	55 5	6	12·58	6
	2	1	80	„	R.	..	„	„	48 47	10	10·55	10
	9	1	80	„	R.	..	„	„	......	..	....	..
166	12	3	79	3889..................	..	H.	6 40	50 20	266 10	10	48·80	10
167	20	1	73	3892..................	R.	..	6 40	81 0	......	..	.....	..
	13	3	79	„	..	H.	....	....	......	..	....	..
	8	3	80	„	..	H.	6 38	81 7	85 32	10	28·41	10
168	19	3	79	3894..................	..	H.	6 43	65 24	238 30	10	27·19	10
169	20	1	72	3895..................	R.	..	6 43	47 40	......	..	....	..
	17	3	79	„	..	H.	6 43	47 40	60e	..	....	..
170	6	3	73	3898..................	R.	..	6 49	56 3	128 47	6	16·90	6
171	24	3	79	3900..................	..	H.	6 49	34 4	284 6	10	2·23	10
172	27	2	74	3906..................	R.	..	6 54	55 26	223 15	4	19·29	4
173	20	4	81	3909..................	..	H.	6 55	47 15	276 47	6	7·96	6
174	25	3	79	3911..................	..	H.	6 54	76 42	43 45	10	21·39	10
175	19	3	80	3919..................	..	H.	6 59	35 11	257 26	10	10·40	10
176	20	1	78	3920..................	R.	..	6 58	48 56	108 5	6	5·54	6
177	15	3	80	3924..................	..	H.	6 59	60 44	356 51	10	15·17	10
178	8	3	80	3927..................	..	H.	6 58	74 15	17 37	10	14·58	10
179	12	3	79	3928..................	..	H.	7 1	34 36	{156 19 286 27 119 24	10 2 2	3·25 34·43 35·45	10 2 2}
180	13	4	81	3929..................	..	H.	6 59	71 52	238 17	6	8·28	6
181	6	2	72	After 3930	R.	..	7 1	59 3	57 5	6	2·82	6
182	7	3	80	3931..................	..	H.	7 2	42 17	40 38	10	73·35	10
183	25	3	79	3932..................	..	H.	7 1	77 36	282 5	6	8·26	6
	15	3	80	„	..	H.	....	....	282 55	10	7·67	10
184	20	4	81	3935..................	..	H.	7 6	49 48	99 3	6	26·07	6
185	16	3	80	After 3936	..	H.	7 7	60 37	26 43	10	4·63	10
186	7	2	72	After 3940	R.	..	7 8	55 22	44 18	8	7·13	7
	24	1	73	„	R.	..	....	....	45 14	6	6·94	6
	17	3	79	„	..	H.	....	....	45 50	10	6·93	10
187	7	2	72	3941..................	R.	..	7 8	60 11	......	..	....	..
	2	3	78	„	R.	..	....	....	293 54	10	1·36	10
	17	3	79	„	..	H.	....	....	270e	..	....	..
	2	4	79	„	..	H.	....	....	......	..	....	..
	17	3	80	„	..	H.	....	....	307 12	4	0·72	10
188	20	4	81	3942..................	..	H.	7 9	33 27	38 22	6	6·28	6
189	17	3	79	3945..................	..	H.	7 10	70 17	300 0	10	13·38	10
	8	3	80	„	..	H.	....	....	299 31	10	12·89	10
190	4	4	81	3947..................	..	H.	7 13	46 2	267 18	6	6·98	6
191	5	4	81	3951..................	..	H.	7 14	50 48	73 47	6	7·17	6
192	22	4	81	3955..................	..	H.	7 15	66 58	32 12	6	25·68	6
193	5	4	81	3956..................	..	H.	7 18	48 17	163 32	6	7·31	6
194	1	4	79	3957..................	..	H.	7 18	35 40	196 10	10	6·89	10
195	12	3	73	After 3959	R.	..	7 17	52 3	16 20	5	9·80	5
196	1	4	79	3960..................	..	H.	7 18	48 18	156 35	10	22·75	10
197	19	2	74	3962..................	R.	..	7 19	56 32	103 10	4	9·27	4
198	21	3	79	3966..................	..	H.	7 21	37 2	141 38	10	6·57	10

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
	280	1 9	....	Clark's companion.
	200	....	....	Aperture, 8 inches; small star appears a hard disc outside the rays of Sirius.
	180	....	....	9 inches aperture; definition splendid, but getting bad towards last measures.
	250	....	....	Clark's companion brighter than distant one, and clear of rays from Sirius: Sirius diameter about ⅓ of the distance of star.
	....	....	....	Examined Sirius, definition fair; distant companion easy, but Clark's companion is very difficult, and looks much smaller than it did on January 1st, and is now in the rays from the large star.
166	159	7 9	....	
167	....	9 9	....	Seen; no change apparent; not measured.
	159	....	....	Not found; haze came over.
	159	9 9	....	Bright wires.
168	159	8 11	....	
169	....	....	....	Not found.
	150	8 13	....	Seen; won't bear light.
170	150	9 9	....	10 magnitude star south following.
171	159	6 11	....	
172	....	9½ 10	....	
173	159	9 11	....	
174	159	7 11	....	
175	150	8 9	....	
176	....	9 9	Both bluish	Pretty; well defined.
177	159	10 11	....	
178	159	9 9	....	
179	159	5 7 5 12 5 15	....	Quadruple. See diagram.
180	159	8 11	....	
181	....	6¾ 7	....	
182	150	7 8	....	
183	159	8 11	....	
	159	8 10	....	
184	159	9 10	....	
185	159	10 10	....	
186	....	8 8	Both very light yellow	Stars very steady; definition middling.
	....	8 8	Both yellow	12 magnitude star south following.
	159	8 8	....	
187	150	9 9½	....	Seen in glimpses with 150; southerly wind spoiled definition.
	250	9 9½	....	Aperture, 8 inches; definition, bad; observations, middling and very difficult; double forms north angle of triangle.
	159	....	....	Seen; elongated.
	150	....	....	Seen.
	333	8 8½	....	
188	150	11 11	....	
189	159	5 8	....	
	150	4 6	....	
190	159	8 10	10 m. blue	
191	150	9 10	....	
[illegible]	159	9 10	....	
[illegible]	150	9 10	....	
[illegible]	159	8 9	....	
[illegible]	150	7 7½	Both yellow	Coarse double, about 12 magnitude north following, to which it points.
[illegible]	150	7 9	....	
[illegible]	....	8 8½	....	H. magnitudes 8-10, now 8-8½.
[illegible]	159	7 8	....	

DOUBLE Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
199	8	4	79	3969..................	..	H.	7 23	34 4	225 52	10	15·95	10
200	6	3	73	3972..................	R.	..	7 23	62 13	44 49	2	20·00	2
201	4	4	79	After 3972............	..	H.	7 24	43 3	74 23	10	22·08	10
202	21	3	72	3974..................	R.	..	7 27	55 6	241 39	5	5·49	5
203	16	3	80	3975..................	..	H.	7 24	81 28	333 53	10	10·14	10
204	22	4	81	3977..................	..	H.	7 27	61 18	70e	..	12e	..
205	14	2	73	3979..................	R.	..	7 29	36 10	......	..	..	..
	6	4	81	,, ...	..	H.	....	....	69 7	6	7·55	6
206	20	2	74	3985..................	R.	..	7 29	67 53	87 16	4	8·99	4
	8	4	79	,, ...	..	H.	....	....	85 45	10	2·82	10
207	24	3	79	3988..................	..	H.	7 33	48 34	302 26	6	16·33	6
208	21	3	72	3907..................	R.	..	7 38	74 0	105 43	6	2·27	6
	24	3	79	,, ...	..	H.	....	....	105 27	10	1·91	10
209	14	2	73	4000..................	R.	..	7 40	58 23	......	..	..	..
	24	3	79	,, ...	..	H.	....	....	......	..	..	..
	15	3	80	,, ...	..	H.	....	....	......	..	..	..
	8	4	80	,, ...	..	H.	....	....	......	..	..	..
210	2	4	79	After 4001............	..	H.	7 40	50 10	133 38	10	52·14	10
211	14	2	73	4009..................	R.	.	7 43	72 23	114 11	6	16·53	6
	15	4	79	,, ...	..	H.	....	....	115 27	10	17·42	10
212	16	4	79	4011..................	..	H.	7 46	66 46	302 49	10	15·95	10
213	1	4	79	4014..................	..	H.	7 48	63 22	154 29	10	10·61	10
214	16	3	80	4016..................	..	H.	7 48	51 9	169 18	10	16·38	10
215	7	3	72	4018..................	R.	..	7 49	59 20	327 3	4	..	..
	10	6	80	,, ...	..	H.	....	....	327 20	4	4·62	4
216	12	3	73	4023..................	R.	..	7 52	70 27	......	..	..	..
217	10	6	80	4025..................	..	H.	7 55	48 54	69 53	6	5·32	6
									37 40	4	39·22	4
									114 38	4	9·50	4
218	7	3	72	4027..................	R.	..	7 54	60 30	283 34	2	29·12	2
									277 38	2	46·44	2
219	28	3	79	4028..................	..	H.	7 56	49 38	46 11	10	16·12	10
220	15	4	79	4030..................	..	H.	7 57	40 57	346 9	10	27·22	10
221	7	3	72	4031..................	R.	..	7 56	60 31	356 7	4	6·11	4
	12	3	73	,, ...	R.	..	....	....	355 6	6	6·13	6
222	28	3	79	4033..................	..	H.	7 57	47 28	66 22	10	11·64	10
223	8	4	80	4034..................	..	H.	7 58	42 36	295 13	10	5·33	10
224	18	4	79	4038..................	..	H.	7 58	41 5	346 17	10	27·59	10
225	16	4	79	4040..................	..	H.	7 59	36 5	135 18	10	19·58	10
226	4	4	79	4043..................	..	H.	8 0	46 13	213 19	10	18·81	10
227	15	4	79	4048..................	..	H.	8 5	41 50	206 43	10	6·93	10
228	18	4	79	1st after 4049	..	H.	8 6	42 16	80 27	10	5·33	10
229	6	3	73	2nd after 4049	R.	..	8 6	46 57	......	..	..	..
	15	4	79	,, ...	..	H.	8 6	46 57	220 25	10	41·41	10
230	8	3	72	4053..................	R.	..	8 4	00 45	130e	..	..	..
231	8	3	72	4055..................	R.	..	8 4	69 33	......	..	7e	..
	24	1	78	,, ...	R.	..	8 6	69 35	7 20	5	6·15	5
232	21	4	79	4056..................	..	H.	8 7	67 9	......	..	..	..
233	23	3	72	After 4058 ε Volantis..	R.	..	8 8	68 16	23 4	6	6·52	6
234	8	3	72	4060..................	R.	..	8 9	36 4	180e	..	20e	..
235	3	4	79	4063..................	..	H.	8 10	36 58	349 42	10	18·18	10
236	9	5	81	4065..................	..	H.	8 10	58 41	226 10	6	9·24	6
237	23	3	72	4067..................	R.	..	8 7	83 22	......	..	..	..
238	17	5	81	4069..................	..	H.	8 11	45 25	253 44	6	32·33	6
239	9	5	81	4071..................	..	H.	8 10	64 8	204 9	6	6·83	6
240	2	3	78	4073..................	R.	..	8 14	36 59	276 52	6	2·31	6

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
199	150	8 9	....	
200	....	10½ 12	....	Smaller star seen in glimpses; no third star seen; very faint—can it be variable?
201	150	5 11	....	
202	150	9 11	Both white.........	
203	150	10 11	....	
204	150	9 13	....	Too faint to measure Herschel's magnitudes, 8-9.
205	150	....	....	Not found.
	150	10 10	....	
206	....	10 10	....	Too cloudy to see if another pair here.
	150	10 11	....	
207	150	9 11	....	Ill-defined.
208	220	7 7	Whitish yellow	Observations moderately good; definition good, but a difficult object.
	150	7 7	....	
209	230	6 11	....	Companion seen in glimpses; definition too bad for measures.
	150	....	....	Not found.
	150	....	....	Not seen.
	150	....	....	Seen; no measures taken, wind shaking the telescope.
210	150	7 8	....	
211	150	5 10	Yellow and bluish....	Definition bad.
	150	5 9	....	
212	150	9 9½	....	
213	150	8 9	....	
214	150	10 10½	....	
215	....	8 9	Faint yellow	Miniature of α Crucis.
	150	9 10	....	
216	....	9 10	....	Seen; no change apparent; definition bad; not measured.
217	150	5 11 11	....	Triple. See diagram.
	....	9 9		
218	....	....	....	In a cluster with 4031 quadruple. See diagram.
	....	9 11		
219	150	8 8	....	
220	150	8 10	White and red.	
221	....	7½ 8	Both white...........	One of a fine cluster of about 100; several are coloured stars.
	....	8 9	....	
222	150	8 9	....	
223	150	9 10	....	
224	150	6 8	Red	Small star, red; probably 4030.
225	150	9 10	....	
226	150	9 9½	....	
227	150	10 10	....	
228	150	7 8	....	
229	....	3 6	....	Herschel's 3rd star 13m. not seen; see diagram; 10 and 10 seen, beautiful object.
	150	3 6	....	11 and 11 m. stars, position 150e, seen as well.
230	....	8 10	....	Triple.
231	....	9 9	Yellow.	
	....	8½ 8½	Faint rose tint.	
232	150	10 10	....	Seen; too foggy to measure.
233	....	5 8	Yellow and white....	Definition and observations good.
234	....	9 10	....	Seen; not measured.
235	150	7 9	....	
236	150	10 10	....	
237	....	8	....	8 magnitude star seen; no companion.
238	150	6 9	....	9 magnitude star red.
239	150	10 10½	....	
240	....	8 9	....	

DOUBLE Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
240	18	4	79	4073..................	..	H.	....	....	183 55	10	1·95	10
241	8	4	80	4075..................	..	H.	8 13	65 58	263 54	10	3·62	10
242	16	4	79	After 4076............	..	H.	8 15	44 39	146 29	10	4·90	10
243	9	5	81	4077..................	..	H.	8 14	62 20	303 23	6	15·27	6
244	23	4	79	4080..................	..	H.	8 16	46 44	87 17	10	5·37	10
245	9	5	81	4082..................	..	H.	8 14	49 53	270 2	6	10·99	6
246	8	4	80	4084..................	..	H.	8 15	58 48	267 41	10	2·88	10
247	23	4	79	4085..................	..	H.	8 16	36 5	......	..	....	..
248	28	4	79	4087..................	..	H.	8 18	40 35	308 53	10	1·28	10
249	10	5	81	4089..................	..	H.	8 19	44 28	270 56	6	13·54	6
250	16	4	80	4090..................	..	H.	8 19	42 33	11 57	10	10·20	10
251	10	5	81	4093..................	..	H.	8 23	38 41	122 33	6	7·87	6
252	10	5	81	4094..................	..	H.	8 22	35 8	218 19	6	16·76	6
253	21	3	71	4104..................	R.	..	8 25	47 30	240 22	4	3·96	4
									38 30	4	18·29	4
	21	3	72	,, ...	R.	..	....	....	241 55	4	4·48	4
									39 0	2	18·93	2
	23	3	78	,, ...	R.	..	....	....	240 47	10	3·56	10
									39 0	2	18·23	2
	28	4	79	,, ...	..	H.	....	....	239 6	10	3·27	10
									37 48	10	18·25	10
	10	6	80	,, ...	..	H.	....	....	244 9	6	3·04	6
									41 29	4	18·52	4
254	13	3	71	After 4104............	R.	..	8 25	44 23	348 10	6	6·26	6
	21	3	71	,, ...	R.	..	....	....	348 4	5	4·92	5
	21	4	79	,, ...	..	H.	....	....	348 31	10	3·75	10
255	6	5	81	4106..................	..	H.	8 27	36 18	143 1	6	8·00	6
256	18	4	79	4109..................	..	H.	8 27	76 0	127 14	10	25·98	10
257	21	4	79	4111..................	..	H.	8 30	49 30	106 38	10	9·19	10
258	13	5	81	4112..................	..	H.	8 31	48 23	26 52	6	8·50	6
259	6	5	81	4116..................	..	H.	8 33	47 1	0 51	6	7·26	6
260	30	4	79	4119..................	..	H.	8 33	49 0	223 11	10	9·69	10
261	1	5	79	4122..................	..	H.	8 35	46 47	154 20	10	10·10	10
262	7	2	72	4125..................	R.	..	8 35	62 29	233 40	6	8·04	6
263	23	2	72	4126..................	R.	..	8 37	52 30	30 2	6	16·53	6
264	14	2	73	4128..................	R.	..	8 36	59 53	39 38	6	2·28	6
265	6	3	73	4130..................	R.	..	8 37	57 3	224 59	6	4·03	6
266	5	4	72	4131 θ Volantis	R.	..	8 39	69 57	......	..	55c	..
267	12	3	72	4140..................	R.	..	8 42	58 17	239 56	4	4·51	4
									222 34	2	60·91	2
									359 36	2	51·55	2
	21	4	79	,, ...	..	H.	....	....	290 32	10	4·68	10
	10	5	81	,, ...	..	H.	....	....	291 32	6	2·71	6
268	12	3	72	4142..................	R.	..	8 44	57 8	226 33	6	4·14	6
269	23	4	79	4144..................	..	H.	8 45	35 27	313 7	10	2·17	10
270	19	2	74	4145..................	R.	..	8 46	53 33	255 24	4	5·89	4
271	19	2	74	4148..................	R.	..	8 47	58 39	112 28	4	6·46	4
272	30	4	79	4155..................	..	H.	8 51	60 58	......	..	....	..
	16	4	80	,, ...	..	H.	....	....	......	..	....	..
273	5	4	72	After 4156............	R.	..	8 54	55 3	230e	..	15e	..
274	5	4	72	4160..................	R.	..	8 54	58 47	73 28	4	40·40	4
275	5	4	72	4165..................	R.	..	8 57	51 42	......	..	....	..
276	22	4	80	4176..................	..	H.	9 2	41 38	......	..	....	..
277	30	4	79	4178..................	..	H.	9 2	57 22	......	..	....	..
278	16	4	80	4181..................	..	H.	9 3	54 15	......	..	....	..
279	26	4	80	4185..................	..	H.	9 5	63 37	241 29	6	9·73	6
280	7	5	79	4188..................	..	H.	9 8	43 7	235 23	10	2·43	10
281	14	5	79	4190..................	..	H.	9 9	57 28	21 29	2	7·73	2
282	25	5	81	4192..................	..	H.	9 10	49 51	9 53	6	25·83	6
283	8	5	79	4195..................	..	H.	9 12	64 23	62 36	10	15·80	10

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
240	159	8 8½		
241	150	10 10		
242	159	8 8		
243	159	10 11		Another in field with this.
244	159	9 9		
245	159	10 11		Definition bad.
246	159	10 10		
247	159	....		Not seen.
248	150	8 8		Herschel's companions 14 and 15 magnitudes not seen
249	150	10 11		
250	159	8 10		
251	159	8 8		
252	150	9 10		
253	....	9	Yellow and blue .... Yellow and blue	Triple.
	....	6 8	Yellow and whitish..	Triple.
	....	6 10	Whitish yellow and blue	
	....	6 8	Bright yellow.	
	....	6 10	10m. white.	
	159	6 9		
	159	6 11		
	159	8 9		
	159	8 11		
254	....	6 10	Yellow and white....	See diagram. A third star 30° east.
	....	....	Yellow and white.	
	159	6 9		
255	159	8 10		Herschel's position 138·3°, and distance 18·00″.
256	150	8 9		
257	159	9 11		
258	159	9 9		
259	150	8 9		
260	150	8 11		
261	150	9 9		Another in field a little south.
262	150	5 10	Yellow and blue	Large star ill-defined; think several small stars near.
263	....	7 11	White and light yellow	One of a cluster; definition bad.
264	230	7 8		
265	....	8 10		Fine double; definition bad.
266	....	5½ 9		Seen; too ill-defined to measure.
	....	7 7	Both straw-yellow..	
267	....	7 11		Definition middling. See diagram.
	....	7 11		
	150	8 8		Foggy night.
	159	8 8		
268	....	7 9	Pale yellow..........	Definition only middling; probably the same as 4130.
269	150	7 11		
270	....	9 9		A small star follows about 8 seconds of time.
271	....	8 9		
272	159	11 11		Seen; too ill-defined to measure.
	159	....		Seen; south star seems nebulous.
273	....	7 8	Red	About same angle; very small star: distance 15″ and angle 230°, with larger, which is red.
274	....	6 7½	Both white..........	
275	....	6 8		Seen, but too close to measure to-night; definition bad.
276	159	9 9		Seen; not measured.
277	150	6 13		Seen; not measured.
278	159	11 11		Seen; not measured.
279	159	9 9		
280	150	7 8		
281	159	7 12		
282	150	9 9		
283	150	9 9		

DOUBLE Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
283	6	5	80	4195	..	H.	9 11	64 27	62 11	4	16·25	4
284	23	5	81	4198	..	H.	9 14	39 58	{ 178 20 180 35	6 6	8·43 22·74	6 6
285	23	5	81	4203	..	H.	9 17	69 18	16 41	6	10·46	6
286	19	5	79	4209	..	H.	9 21	47 45	337 14	10	25·38	10
287	23	4	79	4210	..	H.	9 21	67 0	236 34	10	3·02	10
288	29	2	72	4211	R.	..	9 21	85 10	......	..	....	..
289	7	4	74	4213	R.	..	9 23	61 25	325 25	3	9·06	3
	3	5	79	,,	..	H.	....	....	327 21	10	8·58	10
290	23	3	72	4214	R.	..	9 23	78 8	191 43	4	9·64	4
291	23	5	81	4216	..	H.	9 24	69 26	333 56	6	13·78	6
292	20	5	79	4218	..	H.	9 28	35 56	26 53	2	5·46	2
293	29	2	72	4220	R.	..	9 30	48 28	202 54	3	....	..
	30	4	79	,,	..	H.	9 30	48 28	205 22	10	1·58	10
294	23	3	72	4226	R.	..	9 32	77 44	......	..	....	..
295	23	3	72	4230	R.	..	9 34	77 30	......	..	....	..
296	26	4	71	4232	R.	..	9 35	57 3	302 48	5	11·16	5
	19	5	79	,,	..	H.	....	....	303 13	10	10·46	10
297	28	4	79	4235	..	H	9 37	50 36	88 13	10	4·66	10
298	23	5	79	4248	..	H.	9 42	69 16	319 30	10	10·12	10
299	28	4	79	4249	..	H.	9 44	34 27	126 2	10	4·03	10
300	23	5	79	4251	..	H.	9 44	60 30	314 35	10	12·09	10
301	22	4	71	4252	R.	..	9 45	64 30	125 24	7	4·90	7
	29	6	80	,,	R.	..	....	....	124 22	2	5·18	2
302	17	4	71	4258	R.	..	9 46	75 20	160 31	6	9·01	6
	30	4	79	,,	..	H.	....	....	159 25	10	8·39	10
303	7	5	79	After 4264	..	H.	9 50	44 42	235 34	10	5·01	10
	2	6	81	,,	..	H.	9 49	44 47	230e	..	....	..
304	24	3	71	4265	R.	..	9 49	79 56	229 20	7	13·10	7
	16	4	80	,,	..	H.	9 47	80 6	227 45	10	13·13	10
305	20	5	79	4269	..	H.	9 52	68 33	213 15	10	8·78	10
306	17	4	71	4272	R.	..	9 54	85 28	87 43	6	15·50	6
	8	3	72	,,	R.	..	....	....	88 17	4	15·04	4
	13	5	79	,,	..	H.	....	....	268 36	10	15·56	10
307	13	5	79	4281	..	H.	9 59	79 49	......	..	....	..
308	28	2	72	4283	R.	..	10 0	51 12	178 54	6	8·24	6
	5	4	72	,,	R.	..	....	....	177 26	6	8·08	6
309	16	4	80	4288	..	H.	10 3	75 29	289 59	10	31·83	10
310	20	3	72	4292	R.	..	10 6	65 13	......	..	..	..
311	21	6	81	4297	..	H.	10 7	54 38	{ 305 17 120e	6 ..	9·76 20e	6 } .. }
312	27	5	79	4301	..	H.	10 10	65 9	23 41	10	6·61	10
313	24	3	73	4306	R.	..	10 15	64 4	137 47	4	2·83	4
	7	5	80	,,	R.	..	....	....	......	..	..	..
314	24	3	71	4310	R.	..	10 12	83 30	273 50	4	3·90	4
	7	6	81	,,	..	H.	....	....	270 26	6	2·90	6
315	13	5	79	4312	..	H.	10 17	47 21	264 52	10	30·09	10
316	7	5	79	4314	..	H.	10 17	66 55	12 14	10	18·59	10
317	7	6	81	4323	..	H.	10 24	61 58	219 46	6	21·30	6
318	4	5	80	4324	..	H.	10 25	46 50	63 48	4	7·62	4
	2	6	81	,,	..	H.	....	...	66 17	6	7·24	6
319	7	6	81	4327	..	H.	10 26	53 51	352 4	6	113·07	6
320	7	6	81	4328	..	H.	10 26	51 18	105 50	6	18·72	6
321	19	5	79	After 4328	..	H.	10 27	44 25	36 19	10	18·09	10
322	21	3	73	4329	R.	..	10 26	53 4	63 41	4	21·30	4
	13	6	81	,,	..	H.	....	....	71 40	6	23·43	6
323	23	5	79	4335	..	H.	10 29	69 34	217 2	10	7·56	10
324	21	3	73	4341	R.	..	10 34	54 50	......	..	..	..

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
283	159	10 11	....	
284	159	10 10	....	The two southern stars. } See diagram.
	159	10 10	....	The two extremes.
285	159	9 9	....	Another pair in the field north of this.
286	159	8 9	....	Triple; 3rd star about Herschel's position and distance.
287	159	9 11	....	
288	....	6 10	....	Not divided; definition bad.
289	....	7 10	....	Clouds stopped observations.
	159	6 10	....	
290	....	9 9½	....	Very pretty; well defined.
291	159	10 11	....	Very faint.
292	159	7 12	....	
293	....	6 7	....	A beautiful double star.
	159	7 7	....	
294	....	9 9	....	Seen, about the same position; not measured.
295	....	10 13	....	A and B not more than 10 and 13 magnitudes; C no seen.
296	230	9 9	White	Clouds about.
	159	8½ 9	....	
297	159	9 9	....	
298	159	9 10	....	
299	159	8 8	....	
300	159	9 10	....	
301	230	3 9	....	Fine, clear, E. wind; magnitudes uncertain.
	300	3 9	....	Another pair in the field with this, south following.
302	....	9 9	Both white-yellow.	
	159	9 9	....	
303	159	7 9	....	
	....	....	....	
304	....	9 9	....	
	159	8 9	....	
305	159	8 9	....	
306	....	8 8	Yellow.	
	....	8 8	Both white.	
	159	7 7	....	
307	159	9 10	....	Seen; too faint to measure.
308	....	8 9	Both white.	
	....	7 8	Both white.	
309	159	8 8	....	
310	....	6 11	....	Seen; clouds prevented measures.
311	159	9 10 11	....	Triple. See diagram.
312	159	10 10	....	
313	150	7 7	Both yellow	Very beautiful and well-defined.
	....	....	....	Seen; not measured. There is no double at 63° 36′ S., nor at 50 seconds following it.
314	....	9 9½	Both yellow	Definition fair.
	159	9 10	....	
315	159	7 12	....	
316	150	8 8	....	
317	159	10 10	....	
318	150	9 9½	....	
	150	10 10	....	
319	159	8 8	....	
320	150	10 11	....	
321	159	6 6	....	
322	150	5½ 9	Yellow and brick-red	
	150	5 9	....	
323	159	9 9	....	
324	....	5 6½	Straw-yellow and greenish blue.	Glimpses of several minute points near this.

Double Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
325	26	5	71	B 3127	R.	..	10 35	58 34	19 8	2	15·19	2
	26	6	71	,, ...	R.	..	....	....	20 50	4	14·16	4
326	6	6	79	4351....................	..	H.	10 38	60 38	173 37	10	12·09	10
327	26	4	71	4356.................	R.	..	10 39	58 56	{ 118 10	2	1·95	2 }
									{ 286 23	2	10·67	2 }
328	5	6	79	4356....................	..	H.	10 39	58 56	145 28	10	2·19	10
329	9	6	79	1st after 4359	..	H.	10 39	58 57	105 25	10	12·46	10
330	9	6	79	4360....................	..	H.	10 39	58 57	114 2	10	1·58	10
331	17	6	81	4362....................	..	H.	10 40	43 9	303 17	6	24·99	6
332	7	5	79	4367....................	..	H.	10 41	56 18	142 15	10	12·20	10
333	13	6	79	4373....................	..	H.	10 43	40 54	337 3	10	12·66	10
334	17	6	81	4376....................	..	H.	10 43	69 54	131 51	6	17·05	6
335	13	5	79	4378....................	..	H.	10 47	59 18	345 5	10	31·10	10
336	10	6	79	4381....................	..	H.	10 49	38 12	41 20	10	25·44	10
337	18	4	71	4383....................	R.	..	10 50	70 5	275 16	7	0·79	7
	22	4	71	,, ...	R.	..	....	....	......	..	....	..
	14	5	73	,, ...	R.	..	....	....	270 31	6	2·08	6
	19	5	79	,, ...	..	H.	....	....	283 6	10	1·15	10
338	18	4	71	4390......	R.	..	10 53	82 34	......	..	....	..
339	9	6	79	4392....................	..	H.	10 53	70 42	159 28	10	24·81	10
340	20	5	79	4393....................	..	H.	10 53	68 25	132 41	10	8·45	10
	11	6	79	,, ...	..	H.	....	....	129 2	10	8·15	10
341	25	4	73	4397....................	R.	..	10 57	59 11	......	..	....	..
342	20	6	81	4398....................	..	H.	10 56	56 41	249 40	6	7·50	6
343	6	6	79	4399....................	..	H.	10 59	59 56	133 6	10	8·34	10
344	22	4	71	4400....................	R.	..	11 2	41 58	......	..	....	..
	10	5	79	,, ...	..	H.	....	....	......	..	1·15e	..
	6	6	79	,, ...	..	H.	....	....	......	..	....	..
	17	6	79	,, ...	..	H.	....	....	272 42	10	1·80	10
345	27	6	81	4417....................	..	H.	11 8	54 51	148 59	6	17·42	6
346	10	6	79	4421....................	..	H.	11 11	47 15	......	..	....	..
347	10	6	79	4423....................	..	H.	11 11	45 14	274 37	10	1·71	10
	5	5	80	,, ...	R.	..	....	....	273 22	6	2·19	6
348	3	5	71	4425....................	R.	..	11 14	63 54	......	..	....	..
	13	5	71	,, ...	R.	..	....	....	......	..	....	..
	14	5	73	,, ...	R.	..	11 14	63 54	......	..	....	..
349	1	7	81	4431....................	..	H.	11 17	54 28	226 41	6	9·46	6
350	3	5	71	4432....................	R.	..	11 18	64 22	292 20	6	2·55	6
	14	5	73	,, ...	R.	..	....	....	294 23	6	3·14	6
	3	6	79	,, ...	..	H.	....	....	292 16	10	1·80	10
351	27	6	81	4434....................	..	H.	11 20	54 40	232 6	6	11·18	6
352	2	6	71	4439....................	R.	..	11 23	42 3	166 22	4	13·26	4
	21	3	73	,, ...	R.	..	....	....	......	..	....	..
	10	6	79	,, ...	..	H.	11 23	42 7	168 11	10	13·26	10
353	30	5	72	4440....................	R.	..	11 24	77 51	......	..	....	..
354	1	7	81	4441....................	..	H.	11 24	55 14	174 25	6	8·36	6
355	18	6	79	4453....................	..	H.	11 28	48 50	......	..	15 e	..
356	13	6	79	4459....................	..	H.	11 28	48 45	......	..	....	..
357	9	6	74	4460....................	R.	..	11 34	57 4	176 40	6	9·00	6
	6	6	79	,, ...	..	H.	....	....	176 31	10	8·19	10
358	3	5	71	4462....................	R.	..	11 34	82 23	......	..	....	..
359	29	4	80	4467....................	R.	..	11 37	46 33	142 43	..	18 e	..
360	3	5	71	4468....................	R.	..	11 37	82 23	153 21	3	20·10	3

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
325	....	5½ 7½	Bright yellow and sky blue.	Fine, clear. B = Brisbane.
	159	5½ 7	Yellow and blue	
326	159	8 9	....	
327	159	....	....	In η Argus, cluster triple.
328	159	8 10	....	
329	159	9 10	....	The 10th magnitude star in these two pairs is the same.
330	159	10 10½	....	
331	159	9 9	....	
332	159	10 10	....	
333	159	9 10	....	Angle 111° more than Herschel's. Is it in motion. (?)
334	159	9 10	....	
335	159	7 10	....	
336	159	8 9	....	
337	159	7 8	....	Divided with No. 2 (159); tried 580 to measure distance; distance = diameter of one of the wires = 0·785.
	....	....	....	Tried wire on it for distance; thicker wire = distance from centre to centre, the other wire too thin.
	333	7 8	....	Distance unsatisfactory.
	159	6 8	....	
338	....	....	....	Not found.
339	159	8 8	....	
340	159	7 9	....	
	159	8 10	....	
341	....	11 11	....	Seen; too small to measure to-night, hazy; definition middling.
342	159	9 10	....	
343	159	10 10	....	
344	230 & 580	5 9	....	Seen; could not measure.
	159	....	....	Seen; not measured.
	159	5 9	....	Seen; too ill-defined to measure.
	159	6 8	....	
345	159	9 10	....	
346	159	6 13	....	Seen; not measured.
347	159	9 9	....	
	....	9 9	....	Looked carefully at all the stars near; this is the only double; Herschel must have seen this twice.
348	230	7 0	....	Not divided; definition not first-rate.
	159 & 230	7 0	....	Not divided; position seems wrong, but no other 7 magnitude star nearer than Herschel's 4432.
	....	....	....	Not seen.
349	159	10 11	....	
350	230	6 7	Faint greenish yellow	Divided with power 100, seen double with 150, measured with 230.
	140	6 8	Both straw-yellow.	
	159	6 9	....	
351	159	10 10	....	
352	....	6 8½	Both faint yellow....	Large star round disc.
	....	6 9	Ruddy	Small star, ruddy; cannot divide the large star; definition not good.
	159	6 9	....	
353	....	7 0	....	Companion not seen.
354	159	9 11	....	
355	159	11 11	....	Clouds prevented observations.
356	159	10 10	....	Seen; not measured.
357	....	8 9	Both white.	
	159	7 9	....	
358	....	9 10	....	Seen in field with Herschel's 4468; not measured.
359	....	10 11	....	Seen; no measures.
360	....	7 11	Yellow and blue.	

DOUBLE Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
	20	5	80	4468..................	R.	..	11 33	82 26	140 e	..	24 e	..
360a	8	6	80	4475..................	R.	..	11 43	60 55	310 e	..	3½ e	
	1	8	81	,, ...	..	H.	11 37	82 26	150 e	..	....	..
361	6	6	72	4480......	R.	..	11 49	53 59	......	..	....	..
362	13	6	79	4483	..	H.	11 52	70 42	108 26	10	10·34	10
363	21	8	72	4486 ε Chamæleontis....	R.	..	11 53	77 32	......	..	2 e	..
	6	6	72	,,	R.	..	..	..	178 58	4	1·47	4
	6	4	74	,, ,,	R.	..	..	..	180 13	6	1·88	6
364	18	6	79	4487..................	..	H.	11 54	36 11	126 56	10	5·11	10
365	12	5	71	4490..................	R.	..	12 0	85 2	144 3	5	25·67	5
	10	6	79	,, ...	..	H.	..	..	145 29	10	25·14	10
366	19	4	71	4498..................	R.	..	12 1	65 2	60 7	5	8·88	5
367	16	6	79	4502..................	..	H.	12 2	75 50	358 38	10	13·89	10
368	21	8	72	4504..................	R.	..	12 9	82 41	......	..	....	..
369	5	6	79	4507..................	..	H.	12 6	44 14	179 11	10	12·94	10
370	20	5	72	After 4507	R.	..	12 8	45 2	244 12	6	3·86	6
	11	6	79	,, ...	..	H.	12 8	45 7	246 13	10	2·49	10
371	18	7	81	4508..................	..	H.	12 9	55 13	33 32	6	23·71	6
372	18	6	79	4510.............. ...	..	H.	12 9	35 50	{ 320 e 60 e }	..	....	..
373	2	7	79	4511..................	..	H.	12 11	55 4	295 42	10	8·45	10
374	8	7	81	4518..................	..	H.	12 17	40 46	206 56	6	9·49	6
375	22	5	71	4521..................	R	..	12 19	57 27	......	..	....	..
376	25	4	71	4521 α Crucis	R.	..	12 20	62 26	{ 120 53 201 50	5 2	5·62 89·92	5 2
	16	5	71	,, ,,	R.	..	,,	,,	{ 121 5 202 10	4 6	5·52 90·13	4 6
	8	6	71	,, ,,	R.	..	,,	,,	118 0	11	5·13	11
	13	7	71	,, ,,	R.	..	,,	,,	{ 118 57 201 39	6 2	5·09 89·36	6 2
	6	6	72	,, ,,	R.	..	,,	,,	120 5	4	5·47	4
	8	8	76	,, ,,	R.	..	,,	,,	117 27	6	5·34	6
	6	6	79	,, ,,	..	H.	,,	,,	117 21	9	4·75	10
377	20	5	72	4522..................	R.	..	12 19	68 48	67 16	6	12·99	6
	2	6	74	,, ...	R.	..	..	..	66 46	6	13·02	6
378	22	5	71	4525..................	R.	..	12 24	57 9	......	..	....	..
	9	6	71	,, ...	R.	..	..	..	......	..	....	..
	7	6	80	,, ...	R.	..	12 28	57 13	51 13	2	25·29	2
379	9	6	71	4526 γ Crucis	R.	..	12 23	56 29	35 9	4	100·67	4
	17	6	79	,, ,, ...	..	H.	..	..	34 40	10	101·98	10
380	7	7	81	4534	..	H.	12 32	57 25	282 24	6	14·84	6
381	22	5	71	4539 γ Centauri	R.	..	12 35	48 18	8 50	8	1·18	8
	14	5	73	,, ,, ...	R.	..	..	..	4 13	7	2·29	7
	6	4	74	,, ,, ...	R.	..	..	..	1 38	5	1·61	6
	12	6	80	,, ,, ...	R.	..	..	..	1 16	9	1·39	9
382	16	6	79	4540..................	..	H.	12 35	72 10	167 35	10	11·07	10
383	25	4	71	4544..................	R.	..	12 40	78 48	......	..	....	..
	22	5	71	,, ...	R.	..	..	..	......	..	....	..
	9	6	71	,, ...	R.	..	..	..	......	..	....	..
384	4	7	79	4545..................	..	H.	12 38	74 35	192 1	10	8·95	10
385	5	6	73	4550..................	R.	..	12 40	66 23	98 11	4	13·12	4
	16	7	80	,, ...	R.	..	..	..	94 55	4	13·99	4
386	11	7	79	4555..................	..	H.	12 47	56 34	17 22	10	34·30	10
387	19	7	81	4561..................	..	H.	12 53	77 13	45 56	6	19·26	6
388	15	7	81	After 4561	..	H.	12 53	55 19	126 43	6	16·25	6
389	2	7	79	4562..................	..	H.	12 53	47 59	73 16	10	11·07	10

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
	250	7 10	Yellow and blue	Position and distance estimated; another double in the field with this.
360a	100	9 10		
	159	7 14	....	Small star just visible in dark field. See R. 175.
361	....	9 0	....	No companion found; four stars about 2′ apart.
362	159	11 11	....	Light wires.
363	230	6 10	....	Clearly divided; not measured.
	....	6 6½ or 7	....	Sensibly constant since 1835.
	323	6 6½	....	Position very difficult and unsatisfactory.
364	159	10 10	....	
365	....	7 10	Yellow and blue	This is almost exactly the same as 4468 in colour; distance and angle very striking.
	159	7 10	....	
366	....	7 9	....	
367	159	10 11	....	
368	....	....	....	Not found.
369	159	9 10	....	Herschel's position angle, 227°.
370	....	5 7	Yellow.	
	159	5 7	....	
371	159	9 10	....	
372	159	9 10 9 13	....	Doubtful if this is H. 4510.
373	159	10 10	....	
374	159	8 10	....	
375	....	9 9	Both red.	
376	150 150	2–2½–5	....	
	....	....	White. White and yellow.	See diagram.
	230	....	....	Discs seem equal, if any difference *b* is a shade less than *a*; definition moderate; hazy.
	239 239	....	....	Definition pretty good; stars dancing a good deal.
	....	2 2½	....	Thick fog, and stars dancing.
	200	....	....	Cloudy 6 hours past meridian; definition fair; 8 inches aperture *a* ½ larger than *b*.
	159	2 2½	....	
377	....	8 9	....	
	150	8 9	....	Fine clear night.
378	....	10 11	....	Not found; H gives no description.
	....	....	....	Not found.
	....	10 11	....	
379	....	....	Pale yellow. Faint green.	
	159	2 5	....	
380	159	10 10	....	
381	333	4 4	....	Very fine definition; seen double with 150; measured with No. 4; two round clear discs.
	333	4 4	....	Definition very bad; both stars are one blurred patch.
	333	....	....	Difficult; stars very unsteady; elongated with 150 power.
	800	4 4	....	Definition good, but stars rather unsteady.
382	159	9 9	....	
383	....	9 9	....	Not made out.
	....	....	....	Not seen.
	....	....	....	No companion found; definition moderate.
384	159	9 9	....	
385	150	8 9	....	Fine and clear, after a heavy shower.
	200	7 9	....	No other pair found near this.
386	159	5 6	....	
387	159	11 11	....	
388	159	9 9	... .	
389	159	9 9	....	

DOUBLE Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R	H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
390	13	5	71	4567	R.	..	13 0	47 48	......	..	....	..
	9	6	71	,,	R.	..	......	......	50e	..	18e	..
391	4	6	72	4568 θ Muscæ	R.	..	13 1	64 58	182 44	6	5·35	6
	16	6	79	,,	..	H.	......	......	185 17	10	5·03	10
392	5	6	73	4569	R.	..	13 1	56 2	239 36	6	4·75	6
393	15	7	81	4570	..	H.	13 1	36 37	231 45	6	18·10	6
394	8	7	79	4571	..	H.	13 5	34 36	268 15	10	23·27	10
395	13	5	71	4576	R.	..	13 8	56 28	129 41	6	5·40	6
	20	6	73	,,	R.	..	......	......	130 30	5	6·42	5
	10	6	80	,,	R.	..	......	......	128e	..	....	..
396	13	5	71	4577	R.	..	13 10	59 11	220e	..	....	..
	9	6	74	,,	R.	..	......	......	{ 236 5 { 52 5	4 4	12·06 7·42	4 5
397	20	6	71	4579	R.	..	13 13	63 27	95 1	6	4·58	6
	4	7	79	,,	..	H.	......	......	97 53	10	4·14	10
	10	6	80	,,	R.	..	......	......	97 50	2	4·25	4
	25	6	80	,,	.	H.	......	......	100 34	6	3·99	6
398	2	6	71	After 4579	R.	..	13 13	60 21	343 8	2	60·19	2
	10	7	79	,,	..	H.	......	......	343 8	10	59·72	10
399	15	6	71	4586	R.	..	13 21	67 17	146 8	2	3·88	2
	2	6	74	,,	R.	..	......	......	151 45	6	3·86	6
400	8	7	81	4587	..	H.	13 19	42 26	85 24	6	4·96	6
401	1	6	80	4590	..	H.	13 23	76 56	134 56	10	22·41	10
402	16	7	79	4594	..	H.	13 29	79 58	99 46	10	5·31	10
403	20	7	81	4595	..	H.	13 29	35 5	98 10	6	7·78	6
404	12	5	71	4596	R.	..	13 20	65 7	......	..	....	..
	9	6	71	,,	R.	..	......	......	......	..	....	.. {
	14	6	71	,,	R.	..	......	......	......	..	....	..
	28	4	80	,,	R.	..	......	......	......	..	....	..
	5	5	80	,,	R.	..	......	......	......	..	....	..
405	20	6	71	4598	R.	..	13 32	74 31	45 23	7	12·60	5
406	20	6	71	1713 ζ Centauri	R.	..	13 34	54 0	163 39	5	5·25	5
407	22	7	80	4600	..	H.	13 35	48 23	143 51	2	16·58	2
408	2	7	79	4601	..	H.	13 32	39 9	105 4	10	10·57	10
409	20	7	81	4602	..	H.	13 33	45 10	189 31	6	23·19	6
410	22	7	79	4608	..	H.	13 36	58 42	90 46	10	32·83	10
411	25	4	71	After 4612	R.	..	13 41	61 26	34 54	5	12·05	5
	4	7	79	,,	..	H.	......	......	34 42	10	11·57	10
412	20	7	81	4614	..	H.	13 41	42 35	280 36	6	12·70	6
413	21	7	79	4615	..	H.	13 42	46 48	256 34	10	8·73	10
414	14	6	71	4617	R.	..	13 45	52 14	289 32	5	18·08	5
	27	6	79	,,	..	H.	......	......	......	..	..	..
415	26	7	81	4619	..	H.	13 45	47 18	190 12	6	23·56	6
416	10	7	79	After 4624	..	H	13 47	50 11	76 8	10	17·44	10
417	12	6	71	4628 ζ Centauri	R.	..	13 49	46 42	......	..	..	..
418	30	6	80	4629	..	H.	13 50	77 54	356 57	6	4·39	6
	6	7	80	,,	..	H.	......	......	356 31	6	4·66	6
419	18	6	74	4630	R.	..	13 49	65 4	314 31	6	4·46	6
420	26	7	81	4631	..	H.	13 50	69 49	84 40	6	10·53	6
421	10	7	81	4632	R.	..	13 49	65 5	17 20	6	6·08	6
422	26	7	81	4634	..	H.	....	....	13 40	6	5·74	6

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
390	....	5 0	....	No companion found.
	....	7 14	....	Small star faint; seen only in glimpses; not measured.
391	....	7 9	Both white	Stars steady, but ill-defined.
	150	7 9	....	
392	150	8 10	....	
393	159	9 10	....	
394	159	7 10	....	
395	159	7 10	Yellow and blue.	
	....	7 10	....	Stars bright and clear, but ill-defined; angle observations difficult and unsatisfactory.
	....	7 10	....	Another double near this R.A. and dec.; position 129° 15′ R. 216.
396	....	9 9	....	Triple. See diagram.
	....	10 10	....	All covered by the wire at once, although 11 magnitude star seems a little south of the line; a 10 magnitude star 120e pos. 12″e not mentioned by Herschel.
	....	10 11	....	
397	159	9 9½	White.	
	159	9 9	....	Telescope unsteady.
	....	8½ 9	....	Fine double star.
	159	8 9	....	
398	....	6 7	....	
	159	5 7	....	
399	....	8 10	....	
	....	8 10	....	
400	159	10 10	....	
401	159	6 10	....	
402	159	10 10	....	
403	159	9 9	....	
404	230	8 0	....	Cannot divide this star.
	159,230, 333	....	....	Not divided.
	....	9 0	....	Not found; one seen at 64° 16′ declination; position 130°e; distance, 1″e. See R 222.
	300	8 0	....	11½ inches aperture; in Herschel's position is an 8 magnitude star which I cannot divide, but at R.A. 13h. 30m. and dec. 64° 16′ is a double similar to Herschel's.
	....	....	....	Only one double, here at declination 64° 16; no double in Herschel's position.
405	....	6 13	Yellow	Very difficult.
406	....	6 7	....	Measures not good. 1713 in Herschel's list of measures, page 257.
407	159	7 9	....	
408	159	10 10	....	Atmosphere very unsteady.
409	159	9 10	....	
410	159	8 9	....	
411	159	8 9	Red and green.	
	159	8 8½	....	
412	159	9 10	....	
413	159	9 9½	....	
414	....	7 8	....	Definition bad.
	159	....	....	Seen; not measured.
415	159	8 10	....	
416	159	9 9	....	Telescope unsteady.
417	....	3 0	....	No companion found.
418	159	9 9½	....	
	159	10 11	....	
419	140	8 8¾	....	Well defined.
420	159	11 11	....	
421	....	6 10	....	The following and southern of two pairs.
	159	6 11	....	

Double Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
422	26	7	81	4634....................	..	H.	13 49	55 24	9 44	6	10·71	6
423	5	7	80	4635....................	..	H.	13 51	78 13	251 14	6	12·40	6
424	3	7	72	4642....................	R.	..	13 58	62 52	330e	..	..	..
									10e	..	..	..
425	4	8	81	4645....................	..	H.	13 59	57 8	202 11	6	12e	..
426	2	7	72	4646....................	R.	..	14 0	53 8	22 49	4	22·10	4
427	4	8	81	4648....................	..	H.	14 2	76 46	206 19	6	10·03	6
428	12	5	71	4649....................	R.	..	14 1	59 10	64 45	5	8·22	5
	28	6	72	,, ...	R.	..	....	....	......	..	....	..
	8	7	79	,, ...	..	H.	....	....	64 23	10	8·02	10
429	29	6	80	4654....................	..	H.	14 1	66 10	11 4	6	7·57	6
430	9	8	81	4665....................	..	H.	14 9	42 46	110e	..	18e	..
431	7	6	72	4667....................	R.	..	14 11	73 0	......	..	..	..
	11	7	79	,, ...	..	H.	14 11	73 0	138 15	10	1·60	10
432	28	6	72	4671....................	R.	..	14 15	79 33	... ..	..	..	..
	17	5	73	,, ...	R.	..	....	....	126 50	6	6·76	6
433	9	8	81	4672....................	..	H.	14 13	42 35	303 30	6	3·58	6
434	2	6	71	After 4672............	R.	..	14 14	57 54	160 19	4	9·91	4
									1 0	2	44·69	2
	9	6	71	,, ...	R.	..	....	....	158 4	5	9·66	4
									1 45	2	47·05	2
	16	7	79	,, ...	..	H.	....	....	159 54	10	9·01	10
435	28	6	72	4676....................	R.	..	14 19	59 6	......	..	..	..
	17	6	74	,, ...	R.	..	....	....	262 10	4	20·85	4
									240 41	4	14·05	4
436	12	6	71	4683....................	R.	..	14 21	61 48	......	..	12e	..
											15e	..
437	3	7	72	4684....................	R.	..	14 25	64 21	......	..	..	..
438	18	6	74	4685....................	R.	..	14 27	45 38	......	..	1½e	..
	22	3	82		R.	..	,,	,,	83 22	6	2·21	6
	11	6	80	,, ...	R.	..	,,	,,	......	..	2″e	..
439	11	6	80	4690....................	R.	..	14 29	45 40	23 35	4	19·77	4
440	29	7	79	4691....................	..	H.	14 35	55 17	272 28	10	11·74	10
441	26	9	70	α Centauri	R.	..	14 32	60 21	21 0	1	9·8	1
	27	9	70	,, ...	R.	..	,,	,,	21 58	5	10·40	6
	28	9	70	,, ...	R.	..	,,	,,	22 55	4	10·47	4
	3	10	70	,, ...	R.	..	,,	,,	22 21	5	10·26	5
	5	10	70	,, ...	R.	..	,,	,,	22 5	5	10·70	5
	14	10	70	,, ...	R.	..	,,	,,	20 14	1	9·60	1
	3	6	71	,, ...	R.	..	,,	,,	22 54	10	10·25	10
	13	7	71	,, ...	R.	..	,,	,,	25 5	5	10·02	5
	7	6	72	,, ...	R.	..	,,	,,	25 54	6	9·79	6
	5	7	72	,, ...	R.	..	,,	,,	25 8	3	9·69	3
	2	5	73	,, ...	R.	..	,,	,,	28 24	6	9·50	6
	13	6	74	,, ...	R.	..	,,	,,	30 1	10	7·71	10
	29	6	74	, ...	R.	..	,,	,,	30 2	10	8·22	10
	23	5	76	,, ...	R.	..	,,	,,	33 55	10	4·55	10
	8	6	76	....	R.	..	,,	,,	32 8	10	4·25	10
	5	7	77	....	R.	..	,,	,,	72 52	10	2·60	10
	7	7	77	....	R.	..	,,	,,	72 57	6	3·04	8

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.		Colours.	Remarks.
422	....	7	10	10 m. blue.	Δ's angle 0° 0′. h 310° 6.
423	159	11	11	....	
424	....	8	12	Orange red	Not measured; seems unchanged.
	....	8	16		
425	159	10	11	....	Two other pairs in the field; Herschel's angle 231·8.
426	150	8	0	Orange red & greenish blue.	Angles only middling.
427	159	10	10	....	
428	230	8	8	Red	Definition middling.
	....	9½	10	Both red	Hazy night; position appears unaltered.
	159	9	9	Both red.	
429	159	9	10	....	
430	159	8	12	....	Seen; not measured.
431	....	9	9	....	Only a glimpse; seems unaltered; very foggy.
	159	9	9	....	
432	....	8 .	9	....	Seen; night hazy; position appears unaltered.
	....	8	9	....	Badly defined and hazy.
433	159	4	9	....	
434	....	6	8	Yellow and greenish.	See diagram.
	....	6	11		
	159	5	8	Yellow.	
	159	5	10		
	159	6	8	....	Herschel's 11 magnitude companion not seen.
435	....	8	9	....	Too faint to measure to-night.
	140	8	9	....	Some nebulous light about these stars, but diffused. Herschel appears to have measured 8—9.
	140	8	10	....	Diagram shows 12 magnitude star, about 260°e position, and about 60″ distant. See diagram.
436	....	10	10	....	Two separate pairs in the same field, not a triple.
	....	10	11		
437	....	....		....	No double near this position.
438	140	10	10	....	Seen well with 140 power; angle seems same as Herschel, but distance cannot be less than 1½″.
	200	10	11	....	
	100	....		....	Easily divided with power 100; must be 2″ distance.
439	....	6½	9½	Yellow and blue.....	A very beautiful object.
440	159	9	10	....	
441	....	1	2	....	Definition good.
	....	....		....	Definition good; stars have sharp round discs.
	....	....		....	Stars very unsteady.
	....	....		....	Fine clear moonlight.
	....	....		....	Strong wind, much vibration.
	....	....		....	
	230	....		....	
	....	....		....	Observations only middling, stars dancing a good deal.
	....	....		....	Very thick fog.
	....	....		....	Clouds stopped observations.
	333	....		....	Stars dancing.
	140	....		....	First look through 11½-inch equatorial; small star looks more yellow than usual.
	140	....		Yellow & dark yellow	Definition good; small star looks a darker yellow than large one.
	180	....		White..............	Stars tremulous and watery; aperture 6 inches.
	544	....		....	Aperture 4 inches; moderately steady; large star's diameter = 4/3 of the small star.
	450	....		....	α^2 is ¾ the size of α^1; aperture 8 inches; stars dancing.
	450	....		....	Aperture 8 inches; stars dancing.

DOUBLE Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
	7	7	77	α Centauri	R.	..	14 32	60 21	72 31	8	3·55	8
	20	7	77	,,	R.	..	,,	,,	79 27	10	2·09	10
	20	7	77	,,	R.	..	,,	,,	78 6	4	2·45	4
	24	7	77	,,	R.	..	,,	,,	82 27	4	2·18	4
	24	7	77	,,	R.	..	,,	,,	75 56	6	2·16	6
	25	7	77	,,	R.	..	,,	,,	75 27	14	2·11	14
	8	8	77	,,	R.	..	,,	,,	82 24	6	1·93	6
	6	8	77	,,	R.	..	,,	,,	83 1	5	1·93	5
	6	8	77	,,	R.	..	,,	,,	82 6	6	1·87	6
	7	8	77	,,	R.	..	,,	,,	79 27	7	1·86	7
	18	2	78	,,	R.	..	,,	,,	115 10	10	1 66	10
	28	2	78	,,	R.	..	,,	,,	116 59	10	1·77	10
	4	3	78	,,	R.	..	,,	,,	116 10	20	1 89	19
	20	3	71	,,	R.	..	,,	,,	120 59	4	2·16	4
	28	3	78	,,	R.	..	,,	,,	122 20	10	1·80	10
	13	4	78	,,	R.	..	,,	,,	127 22	10	1·77	10
	5	6	79	,,	..	H.	,,	,,	172 33	4	3·79	4
	11	7	79	,,	..	H.	,,	,,	174 33	10	3·03	10
	12	6	80	,,	R.	..	,,	,,	184 59	10	5·52	10
	13	4	81	,,	..	H.	,,	,,	18[illegible] 53	4	5·07	4
	19	7	81	,,	..	H.	,,	,,	190 8	6	7·52	6
442	14	6	71	2nd after 4691 α Circini.	R.	..	14 32	64 26	240 7	4	15·74	4
	1	6	72	,,	R.	..	....	....	240 26	6	15·66	6
	16	7	79	,,	..	H.	....	....	238 34	10	15·19	10
443	25	7	79	4692	..	H.	14 33	42 11	117 16	10	10·34	10
444	2	7	72	4693	R.	..	14 34	54 41	22 11	4	6 05	4
445	1	6	72	2nd after 4693	R.	..	14 37	55 3	107 42	3	67·59	3
446	3	7	72	4695	R.	..	14 38	74 26	......	..	..	..
447	4	6	72	4697	R.	..	14 30	70 2	......	..	..	..
	10	7	79	,,	..	H.	....	....	136 59	10	14·07	10
448	3	7	72	4698	R.	..	14 39	51 52	......	..	..	..
449	10	7	71	4699	R.	..	14 40	58 54	124 46	4	36·89	4
450	4	6	72	4703	R.	..	14 43	78 1	......	..	..	..
451	15	7	81	4706	..	H.	14 43	46 56	216 42	6	6·26	6
452	22	5	71	4707	R.	..	14 44	65 55	......	..	..	..
453	5	6	73	4712	R.	..	14 46	54 54	227 18	6	7·04	6
	19	7	81	,,	..	H.	....	....	228 14	6	6·35	6
454	19	7	71	4714	R.	..	14 48	63 2	144 31	4	22·47	4
455	21	7	79	4715	..	H.	14 50	47 30	275 57	10	2·34	10
456	16	7	79	4719	..	H.	14 51	58 28	40 18	10	22·95	10
457	8	7	72	4723	R.	..	14 53	51 27	106 29	4	5·60	4
458	4	6	72	4728 π Lupi	R.	..	14 57	46 33	100 3	..	0·57	..
	12	6	80	,,	R.	..	....	....	99 18	10	0·90	10
	3	7	80	,,	R.	..	....	....	......	..	..	..
	20	7	81	,,	R.	..	....	....	......	..	..	..
459	16	5	71	4734	R.	..	15 2	54 52	244e	..	12e	..
460	2	7	72	4739 ζ Lupi	R.	..	15 3	51 40	249 17	4	71·71	4
461	21	7	79	After 4739 κ Lupi	..	H.	15 3	48 18	144 14	10	26·91	10

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
	800	....	....	
	500	....	....	Aperture 7 inches; definition rather poor.
	500	....	....	Aperture 5 inches; clouds stopped observations.
	800	....	....	Aperture 7 inches; α^2 is $\frac{2}{3}$ the diameter of α^1.
	800	....	....	Aperture 7 inches; stars dancing and unsteady.
	800	....	....	Clouds hide α^2 oftener than α^1; α^2 from $\frac{1}{2}$ to $\frac{1}{3}$ less brilliant than α^1; aperture 5 inches; observations good; stars dancing.
	800	....	....	Aperture 6 inches; definition very good, some dancing.
	800	....	....	Telescope west.
	800	....	....	Telescope east.
	800	....	....	Aperture 5 inches; observations not good.
	800	....	....	Definition sometimes good, at others bad.
	800	....	....	Definition fair; aperture 6 inches; small star = $\frac{2}{3}$ diameter of large star.
	800	....	....	Aperture 8 inches.
	....	....	....	Bad definition; stopped observations.
	800	....	....	Aperture 7 inches; definition pretty good; $\alpha^2 = \frac{2}{3}$ of α^1 diameter.
	800	....	....	Steady definition; full aperture.
	159	....	....	Diameter of large star 2·75″.
	159	....	....	
	800	1 1½	Both yellow.	
	159	1 1	....	The ghost measured as well; pos. 138·52; distance, 5·01; magnitudes, 10 and 10; very hard and well defined.
	580	....	....	Good observations.
442	....	8 8	White.	
	....	4 8	Faint yellow & orange	Stars moderately steady; very beautiful colours, but not a good night for observations.
	159	4 9		
443	150	9 9		
444	....	8 8	Faint blue.	
445	....	6 7	Yellow and orange....	Very wide double.
446	....	7 11	....	Not found.
447	....	8 9	....	Seen; no remarkable change noticed.
	150	8 9	....	
448	....	5 17	Yellow	Companion just seen in glimpses; 16 or 17 magnitude large star yellow.
449	....	6 10	Yellow and blue	Definition middling.
450	....	8 0	Orange..............	Large star orange; companion not seen.
451	159	9 10	....	
452	....	....	....	Not found; foggy.
453	150	8 8	....	
	159	9 9	....	
454	....	7 8	....	Stars steady; definition middling.
455	159	7 8	....	
456	159	9 9	....	
457	....	7 11	Yellow and blue.	
458	230	5 5	....	Elongated with 150 power; night not good for observations; distance = diam. of thick wire.
	800	5 5	....	A beautiful double star.
	300	....	....	Clearly divided; 11½ inches aperture.
	100, 200, 800.	....	....	100 power not round, 200 divides it, 800 makes it a wide double.
459	....	5 14	Yellow and blue.	
460	....	4 6	....	
461	150	5 8	....	

DOUBLE Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
462	1	7	72	4742..................	R.	..	15 5	75 8	......	..	..	..
463	8	6	71	4746..................	R.	..	15 6	58 37	350 18	4	12·81	4
	22	7	79	,, ...	..	H.	15 6	58 42	......	..	..	..
464	26	6	71	4747..................	R.	..	15 8	55 16	141 15	4	6·06	4
465	1	7	72	4751..................	R.	..	15 9	74 48	123 41	4	5·33	4
466	22	7	79	4752..................	..	H.	15 10	47 28	129 31	10	22·17	10
467	17	6	74	4753..................	R.	..	15 10	47 26	163 49	10	1·78	10
468	8	6	71	4757 γ Circini	R.	..	15 13	58 53	93 19	2	0·50	2
	5	6	73	,, ...	R.	..	....	....	87 49	6	1·31	6
	9	8	81	,, ...	..	H.	....	....	91 53	6	0·64	6
469	1	6	80	4760..................	..	H.	15 17	77 5	17 6	10	18·21	10
470	3	7	71	4701..................	R.	..	15 15	64 57	1 22	4	12·26	4
471	12	8	81	4763..................	..	H.	15 16	55 4	325 0	6	10·78	6
472	14	7	73	4771..................	R.	..	15 21	57 40	4 8	6	5·65	6
473	1	7	72	4773..................	R.	..	15 22	73 37	72 26	4	7·76	4
474	30	5	72	4777..................	R.	..	15 23	57 0	300 19	6	6·03	6
475	12	8	79	4778..................	..	H.	15 23	52 35	205 15	10	12·48	10
476	18	6	74	4780..................	R.	..	15 26	80 10	271 55	6	5·63	6
477	20	6	71	4786 γ Lupi	R.	..	15 27	40 47	......	..	....	..
	3	7	77	,, ...	R.	..	,,	,,	270e	..	....	..
	5	7	77	,, ...	R.	..	,,	,,	......	..	....	..
	7	7	77	,, ...	R.	..	,,	,,	......	..	....	..
	7	8	77	,, ...	R.	..	,,	,,	......	..	....	..
	30	7	80	,, ...	R.	..	,,	,,	270e	..	....	..
	1	9	80	,, ...	..	H.	,,	,,	......	..	....	..
	20	7	81	,, ...	R.	..	,,	,,	......	..	....	..
478	20	6	71	4787..................	R.	..	15 32	79 16	304 10	6	10·32	6
	11	7	74	,, ...	R.	..	....	....	305 16	4	10·46	4
	14	7	80	,, ...	..	H.	....	....	305 56	6	11·71	6
479	25	8	80	4788 f Lupi............	..	H.	15 28	44 34	356 5	6	1·98	6
480	26	7	72	4789..................	R.	..	15 28	54 8	89 22	5	13·96	5
	25	8	80	,, ...	..	H.	....	....	89 43	6	12·94	6
481	12	8	81	4790..................	..	H.	15 33	78 22	......	..	....	..
482	3	7	72	4792..................	R.	..	15 34	72 4	110 37	4	8·34	4
	..	..	..	,, ...	..	H.	....	....	......	..	....	..
483	20	6	71	After 4792............	R.	..	15 34	57 43	91 55	6	6·75	6
484	10	8	81	4795..................	..	H.	15 35	58 48	219 20	6	6·76	6
485	2	9	80	4796..................	..	H.	15 36	58 18	117 44	6	32·51	6
486	25	7	71	4799..................	R.	..	15 37	65 4	......	..	....	..
	1	8	71	,, ...	R.	..	....	....	153 48	6	2·61	6
	12	8	79	,, ...	..	H.	....	....	154 14	10	1·56	10
487	25	8	80	4800..................	..	H.	15 36	45 23	189 53	6	6·16	6
488	16	8	81	4801..................	..	H.	15 42	76 51	160e	..	10e	..
439	25	7	71	4807..................	R.	..	15 41	54 43	18 48	6	21·39	6
	2	9	80	,, ...	..	H.	....	....	18 12	6	21·52	6
490	27	8	80	4808..................	..	H.	15 42	44 4	58 9	6	6·84	6
491	25	7	71	4809..................	R.	..	15 43	60 20	49 3 257 23	1 1	....	..
	31	7	79	4809..................	..	H.	15 43	60 20	49 13	7	44·23	7
492	1	8	81	4810..................	..	H.	15 42	46 10	65 35	6	16·38	6
493	27	8	80	4811..................	..	H.	15 43	42 5	62 36	6	6·93	6
494	27	8	80	4812..................	..	H.	15 44	37 46	67 53	6	7·83	6
495	1	6	71	4813 κ Circini	R.	..	15 45	59 49	96 50	3	2·62	3
	18	7	71	,, ...	R.	..	....	....	100 5	10	3·61	10
	1	8	71	,, ...	R.	..	....	....	99 41	6	3·81	6
	1	9	80	,, ...	..	H.	....	....	100 28	6	2·66	6

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
462	....	6 0	....	Companion not found.
463	....	8 11	Yellow......	*a* and *d* measured line points 2*f* following *g*. See diagram.
	159	....	....	Seen multiple; nine stars.
464	....	9½ 9½	....	Definition middling.
465	....	9 9	....	Another star south following.
466	159	6 8	....	
467	230	6 6	....	Very fine double.
468	333	....	....	Definition bad; very difficult.
	333	6 6	....	Seen well with 150 power.
	580	7 7	....	Good observations.
469	159	8 10	....	
470	....	9 9	....	
471	159	10 10	....	
472	150	9 9	....	Bad definition; though clear night.
473	150	8½ 8½	....	Definition and steadiness pretty good.
474	....	8 8	Both white..........	Foggy.
475	159	8 8½	....	
476	....	10 11	....	Very difficult, so faint.
477	159,230, 580	4 4	....	Moderately well defined, but not divided.
	450,800, 1200	....	....	Elongated in direction of motion; smaller end goes first; not divided.
	450,1200	....	....	Not divided; ill-defined.
	1200	....	....	Not elongated.
	800,520, 150	....	....	Not elongated.
	1200	....	....	Seems elongated; position about 270.
	580	....	....	Not elongated with the highest power.
	800	....	....	Round with various powers up to 800.
478	....	9 10	....	Another in field with this.
	....	9 10	....	
	159	7 8	....	
479	159	5 8	....	Much cirrus about.
480	....	8 8½	... .	Definition pretty good.
	159	9 9	....	
481	150	8 11	....	Seen; too windy to measure.
482	....	8½ 9½	....	Very faint.
	....	....	....	
483	....	7 10	Yellow-blue	Definition very middling.
484	159	8 11	....	Clouds came over from the westward
485	150	8 8	....	
486	....	7 7	....	Definition horrible; can only see position; is about same as Herschel's.
	....	7 7	....	First four observations definition good; got worse at the last.
	159	7 7	....	
487	150	9 9	....	
488	150	9 12	....	Viewed only; night cloudy.
489	....	6 9	....	Two other companions. See diagram.
	159	7 10	....	Two more companions—14-14 magnitudes.
490	150	11 11	....	Light wires; very faint.
491	....	{7 9} {7 9}	....	Reading of position only.
	159	7 9	....	Third star 10th mag.; clouds stopped observations.
492	159	9 10	....	
493	150	10 10	....	Light wires.
494	150	10 10½	....	
495	230, 159	7 9	Pale yellow and green	Definition bad.
	....	6 8	....	Definition middling, but stars are steady.
	....	6 10	Yellow and blue	Definition bad; thin clouds about.
	159	7 10	....	

DOUBLE Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
496	14	7	73	4815..................	R.	..	15 45	50 0	7 43	4	1·58	4
497	22	6	72	4816..................	R.	..	15 50	83 48	......	..	....	..
498	5	6	73	4819..................	R.	..	15 49	66 20	......	..	....	..
499	27	8	80	4822..................	..	H.	15 51	38 49	90 24	6	7·41	6
500	18	8	79	After 4823............	..	H.	15 52	38 5	21 2	10	7·06	10
501	1	9	80	4824..................	..	H.	15 54	45 56	248 30	6	9·69	6
502	19	7	71	4825..................	R.	..	15 53	57 26	249 15	5	10·32	5
503	2	9	80	4827..................	..	H.	15 56	44 3	167 51	6	14·06	6
504	2	8	71	4829..................	R.	..	15 56	59 44	172 53	6	8·17	6
	8	7	73	,, ...	R.	..	....	....	173 35	6	8·08	6
505	30	5	72	After 4820 δ Apodis ..	R.	..	16 2	78 21	12 56	4	102·36	4
506	19	8	79	4833	.	H.	16 1	46 1	......	..	....	..
507	3	8	71	4835..................	R.	..	16 3	53 55	79 36	6	9·80	6
									161 33	6	8·91	6
508	24	8	80	4836..................	..	H.	16 10	34 35	299 36	6	4·17	6
509	14	8	79	4837..................	..	H.	16 4	43 23	73 20	10	8·60	10
510	19	8	81	4838..................	..	H.	16 5	49 50	184 45	6	23·75	6
511	18	8	80	4840..................	..	H.	16 10	34 35	297 20	6	4·76	6
512	29	8	81	4841..................	..	H.	16 11	49 54	359 52	6	20e	..
513	8	7	73	4844..................	R.	..	16 15	59 10	......	..	....	..
514	18	8	79	4846..................	..	H.	16 16	48 4	151 25	10	11·46	10
515	13	7	71	4847 ι Tri. Aust.......	R.	..	16 15	63 43	22 5	6	22·45	6
	4	8	71	,, ,, ...	R.	..	....	....	21 15	4	21·69	4
516	7	6	80	4849..................	R.	..	16 18	65 48	......	..	..	..
	19	8	81	,, ...	..	H.	....	....	149 25	6	15·75	6
517	22	7	80	4850..................	..	H.	16 19	57 29	......	..	..	..
518	19	8	81	4852..................	..	H.	16 17	37 39	145 8	6	14·66	6
519	15	7	71	4853..................	R.	..	16 18	47 18	335 36	6	23·07	6
	29	8	81	,, ...	..	H.	....	....	336 2	6	22·43	6
520	13	7	71	4854..................	R.	..	16 19	57 29	......	..	..	..
	4	6	72	,, ...	R.	..	,, ,,	,, ,,	46 25	1	1·75	1
	17	6	74	,, ...	R.	..	,, ,,	,, ,,	......	..	..	..
	5	6	80	,, ...	R.	..	,, ,,	,, ,,	......	..	..	..
	16	7	80	,, ...	R.	..	,, ,,	,, ,,	......	..	..	..
	24	8	80	,, ...	..	H.	,, ,,	,, ,,	......	..	..	..
521	19	8	79	After 4854	..	H.	16 22	67 58	299 6	10	7·02	10
	29	7	80	,, ...	..	H.	....	....	297 5	6	5·87	6
522	7	8	72	4857..................	R.	..	16 22	46 13	72 39	5	7·44	5
	18	8	80	,, ...	..	H.	16 23	46 14	73 26	6	5 19	6
523	15	7	71	4858..................	R.	..	16 25	77 16	......	..	..	..
524	13	7	71	4860..................	R.	..	16 27	79 27	......	..	..	..
525	24	8	80	4861..................	..	H.	16 25	47 53	......	..	..	..
526	22	6	72	4862..................	R.	..	16 26	61 19	179 55	4	10·88	4
	19	8	79	,, ...	..	H.	....	....	177 54	10	9·95	10
527	1	9	80	4863..................	..	H.	16 28	53 33	121 7	6	3 48	6
528	20	7	72	4865..................	R.	..	16 31	83 49	......	..	..	..
529	15	7	71	4866..................	R.	..	16 30	56 46	......	..	..	..
	10	8	71	,, ...	R.	..	16 29	56 46	124 8	6	3·80	6
	14	8	73	,, ...	R.	..	16 29	56 46	......	..	..	..
	12	8	79	,, ...	..	H.	16 30	56 47	124 40	10	3·06	10
530	21	9	80	4867..................	..	H.	16 30	43 12	296 12	6	14·68	6

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
496	....	8 12	....	Definition bad; hazy.
497	....	....	....	Companion seen; too faint to measure; seems unaltered.
498	....	10 12	....	Seen; no change apparent; too faint to measure.
499	159	10 10	....	
500	159	5 9	....	
501	159	10 12	....	
502	....	9 11	....	
503	159	10 11	....	Light wires.
504	....	8½ 8½	....	Foggy night; in the apex of a triangle. See diagram
	140	9 9	Light blue and red ..	The pair form apex of triangle.
505	....	6 6	Both yellow	Third star not seen; bad night.
506	159	11 11	....	Seen; not measured.
507	159	9 9	Slight tinge of red ..	Another in field.
	159	9 12		
508	159	8 9	....	No double in h.'s place; this is same as 4840.
509	159	9 9	....	
510	159	9 10	....	
511	159	9 9½	....	
512	159	6 12	....	
513	....	10 11	....	Seen; too faint to measure; no apparent change.
514	159	9 10	....	
515	....	7 12	Light yellow and blue	Two other pairs in the field south of this.
	....	7 11	Yellow and blue.	
516	....	7 11	....	Seen; no change apparent; not measured.
	159	8 11	11. m. blue.	
517	159	....	....	Not found.
518	159	10 11	....	Light wires; Herschel's position, 115°; distance, 6″.
519	159	5 8	Both faint greenish yellow.	
	580	8 10	....	
520	....	6	....	Not divided; definition middling.
	230	....	....	Seen easily and measured with 230. It is just possible that some other pair than 4854 may have been seen on this occasion; only one measure taken; it was just looked at in passing.
	140,435	....	Orange yellow	Not divided; definition not good.
	800	....	....	Large star, suspected double but now proved single; night very favourable.
	800	....	Yellow.............	Looked carefully; a single star in Herschel's place; clear disc with all powers on 11½ refractor.
	159	6	....	No companion.
521	159	10 10	....	Light wires.
	159	10 11	....	
522	....	8½ 10	White and reddish.	
	159	8 10	....	
523	....	....	....	No companion found; definition moderate.
524	....	9 13	....	Too faint to measure; position estimated same Herschel's.
525	159	6	....	No companion.
526	....	9 9½	....	
	159	9 9½	....	
527	159	9 10	....	
528	....	8 0	....	Two 8 magnitude stars here; neither has a close companion; the following star has two distant companions.
529	....	7	....	Companion not seen.
	159	6½ 7	Faint yellow	Definition very good.
	140	7 7	....	No apparent change.
	159	8 8	....	
530	159	7 10	....	Very bad definition.

DOUBLE Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
531	21	9	80	4868	..	H.	16 29	50 19	76 13	6	17·62	6
532	18	8	80	4874	..	H.	16 33	60 42	297 8	6	2·82	6
533	24	8	80	4885	..	H.	16 39	48 9	{ 244 24	6	3·68	6
									{ 13 8	4	44·81	4
534	18	8	80	4889	..	H.	16 44	37 15	7 44	6	6·49	6
535	13	7	71	4890	R.	..	16 45	46 43	147 13	5	31·43	5
536	29	8	81	4892	..	H.	16 46	41 35	299 23	6	8·34	6
537	13	7	71	4896	R.	..	16 47	46 40	23 41	6	4·50	6
538	18	8	80	4899	..	H.	16 49	45 45	275 22	6	3·19	6
539	11	8	71	4901	R.	..	16 51	58 40	131 1	6	3·06	6
	20	6	73	,,	R.	..	....	....	132 15	6	3·29	6
540	27	6	72	4904	R.	..	16 54	75 14	183 31	4	7·11	4
541	27	6	72	After 4904	R.	..	16 52	54 57	62 29	4	33·17	4
542	30	8	81	4906	..	H.	16 53	48 45	......	..	..	..
543	1	9	80	4908	..	H.	16 54	39 33	176 55	6	4·15	6
544	1	8	71	4909	R.	..	16 53	50 54	103 51	3	16·38	3
	22	7	72	,,	R.	..	....	....	{ 104 8	4	16·86	4
									{ 241 9	4	12·43	4
	29	7	72	,,	R.	..	....	....	{ 239 3	4	29·38	4
									{ 189 6	2	49·32	2
									{ 104 55	2	..	..
	16	7	80	,,	R.	..	16 55	50 56	{ 104 20 }	..	22·68	..
									{ 158 }			
	22	7	80	,,	..	H.	16 53	51 5	{ 243 33	6	18·85	6
									{ 105 29	4	15·52	4
545	19	7	71	4914	R.	..	16 58	72 33	75 56	6	3·62	6
	14	8	79	,,	..	H.	....	....	77 34	10	2·47	10
546	18	8	79	4916	..	H.	16 59	49 20	276 35	10	9·47	10
547	31	7	72	4917	R.	..	17 0	54 12	......	..	..	..
548	24	7	71	After 4917	R.	..	17 0	67 4	340 55	7	27·91	7
549	15	7	71	4919	R.	..	17 1	46 36	165 12	6	8·10	6
	2	9	79	,,	..	H.	....	....	165 27	10	7·30	10
550	14	8	71	4920	R.	..	17 2	58 26	326 39	6	3·15	6
	21	6	73	,,	R.	..	....	....	333 6	5	3·00	5
551	4	10	80	4926	..	H.	17 6	39 37	......	..	..	..
552	4	10	80	4928	..	H.	17 8	38 26	301 0	6	12·96	6
553	2	8	71	4930	R.	..	17 9	54 14	44 50	4	9·04	4
554	2	8	71	4931	R.	..	17 9	59 18	254 36	4	2·22	4
	21	6	73	,,	R.	..	....	....	259 6	5	..	..
	23	6	73	,,	R.	..	....	....	257 7	6	0·57	1
	19	8	79	,,	..	H.	....	....	257 20	10	1·00	10
555	25	8	77	4935	R.	..	17 11	34 51	{ 224 23	4	1·97	4 }
									{ 132 23	..	..	.. }
556	4	10	80	4936	..	H.	17 12	45 58	77 28	6	6·23	6
557	31	7	72	4938	R.	..	17 12	56 20	......	..	..	..
558	22	6	72	4942 γ Arae	R.	..	17 15	56 18	329 28	6	16·65	6
559	20	9	81	4944	..	H.	17 16	47 2	167 32	6	13·08	6
560	2	9	80	4949	..	H.	17 18	45 45	263 11	6	1·82	6
561	19	9	81	4953	..	H.	17 19	43 50	170 12	6	13·25	6
562	2	9	80	4957	..	H.	17 23	46 30	270e	..	1e	..
563	1	9	81	4959	..	H.	17 26	54 34	......	..	..	..
	7	9	81	,,	..	H.	,,	,,	......	..	..	..

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
531	159	9 10	....	Declination differs from Herschel's h 50° 5′.
532	159	10 10	....	
533	159	8 9	....	Triple. See diagram.
	159	8 8		
534	159	6 9	....	
535	....	8 9	....	A pair, 10-10 magnitudes, position 150°e; follows this in 11s.; in a field 80s. diameter I see 20 stars from 9 mag. downwards; H. said there were none.
536	159	9 11	....	North, preceding a cluster.
537	159	8 9	....	
538	159	10 10	....	Bright wires.
539	....	8 8	Both white.	
	....	8 8	....	A 6 magnitude star, south following.
540	150	8 9	....	Definition only middling; no third star seen.
541	....	11 or 11½	Ruby red and blue ..	Two stars seen, but no companion; night pretty good, but discs of stars too large.
542	159	....	....	Not found.
543	159	10 10	....	In a cluster.
544	....	8 8	Both blue	Base of the pentagon.
	....	8 8½	....	Definition bad; observations very difficult; five stars forming a pentagon.
	....	8 11		
	....	8 11	....	a to d, a to f, d to e: f is too faint to measure, distance estimated as one-tenth more than from *a* to *d*. See diagram. *d* = 11 magnitude. *f* = 11 ,, *e* = 12 ,, *c* = 12 ,,
	....	8 11		
	....	11 12		
	....	8 8	....	Pos. 158° = *a* to *c*.
	159	8 10	....	*b* to *c*.
	159	8 8		*a* to *b*.
545	....	....	....	Magnitudes doubtful; very bad definition.
	159	9 9	....	Foggy.
546	159	9 9	....	
547	....	8 0	Orange yellow	No companion seen.
548	....	6 9	Yellow and blue.	
549	....	7 8	....	Ill-defined, but steady.
	159	8 9	....	
550	....	8 10	Faint yellow and blue	Bad light.
	....	8 9	White and blue......	Fine and clear cold night.
551	....	7 12	....	Seen.
552	159	9 10	....	
553	....	9 10	....	
554	....	8 8	....	Clouds passing; definition very bad.
	140, 333	....	....	Angle about 260°; seen elongated with 140 power not divided with 333.
	240	....	....	Seen clearly divided with 140.
	159	9 9	....	
555	....	6 7	....	Second position observation is of a distant companion; large star is a close double; 24 Aug., '77. R 298. See diagram.
		6 7		
556	159	9 10	....	
557	....	8 8½	....	Seen; no change noticed.
558	....	8 12	....	Very ill-defined; third star seen in glimpses; position about 50°.
559	150	10 10	....	
560	150	6 6½	....	
561	150	7 9	....	
562	150	11 11	....	
563	159	....	....	Not found; definition very bad.
	150	....	....	Not found.

Double Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
564	7	9	81	4961	..	H.	17 28	59 52	151 33	6	16·40	6
565	20	6	73	4965	R.	..	17 29	51 5	232 36	6	13·97	6
566	1	9	81	4966	..	H.	17 30	34 56	......	..	12e	..
567	19	9	81	4969	..	H.	17 32	53 56	48 52	6	15·92	6
568	19	9	81	4970	..	H.	17 33	48 35	70 49	6	7·22	6
569	7	9	81	4973	..	H.	17 36	45 12	26 58	6	12·09	6
570	20	7	71	4975	R.	..	17 38	55 22	......	..	..	..
	26	7	80	,,	R.	..	....	....	......	..	..	..
	30	7	80	,,	..	H.	....	....	......	..	..	..
	7	9	81	,,	..	H.	....	....	......	..	..	..
	16	9	81	,,	..	H.	....	....	......	..	..	..
571	19	9	81	4978 ν Arae	..	H.	17 41	53 30	276 30	6	11·85	6
572	7	9	81	4984	..	H.	17 43	52 24	7 20	6	11·85	6
573	16	9	81	4985	..	H.	17 44	62 57	264 18	6	20·39	6
574	5	8	72	4992	R.	..	17 47	57 40	5 22	5	5·18	5
	2	9	79	,,	..	H.	....	....	11 12	9	4·31	10
575	19	7	71	4994	R.	..	17 47	52 12	29 0	4	13·87	4
576	15	8	71	4996	R.	..	17 49	62 11	......	..	..	..
577	20	7	71	4998	R.	..	17 51	56 56	......	..	..	..
578	26	7	71	4999	R.	..	17 53	75 14	173 22	6	12·87	6
579	16	9	81	5004	..	H.	17 54	42 5	208 45	6	12·03	6
580	15	8	71	5006	R.	..	17 54	59 13	......	..	..	..
581	15	8	71	5008	R.	..	17 59	66 25	......	..	..	..
	13	8	73	,,	R.	..	....	....	......	..	..	..
582	18	8	79	5014	..	H.	17 58	43 24	90e	..	..	..
	16	6	80	,,	R.	..	....	....	79 18	10	0·81	8
583	3	9	80	5023	..	H.	18 2	40 28	277 32	6	5·85	6
584	24	7	71	5024	R.	..	18 3	63 8	7 4	6	41·62	6
585	20	7	71	5027	R.	..	18 3	54 25	84 42	6	12·98	6
	16	9	81	,,	..	H.	....	....	91 52	6	11·42	6
586	15	8	71	5029	R.	..	18 4	57 53	113 11	6	2·93	6
	2	9	79	,,	..	H.	....	....	112 18	10	1·99	10
587	11	9	73	5038	R.	..	18 11	71 53	303 46	5	11·81	5
588	3	8	71	5041	R.	..	18 15	53 43	258 35	4	3·27	4
	14	8	73	,,	R.	..	....	....	259 52	8	3·11	8
	3	9	80	,,	..	H.	....	....	264 52	6	1·82	6
589	7	10	80	5044	..	H.	18 22	55 35	356 46	6	13·80	6
590	26	9	81	5046	..	H.	18 23	48 20	75 8	6	6·24	6
591	5	8	72	5048 ζ Pavonis	R.	..	18 28	71 33	355 10	1	49·75	1
592	18	7	71	5053	R.	..	18 33	55 53	216 55	6	3·21	6
	6	8	80	,,	..	H.	....	....	225e	..	30e	..
593	4	8	71	5054	R.	..	18 33	47 47	... ..	..	15e	..
	26	9	81	,,	..	H.	....	....	326 52	6	16·17	6
594	26	7	71	5055	R.	..	18 33	52 59	73 54	6	7·76	6
595	18	7	71	5056	R.	..	18 35	55 48	196 45	3	32·57	3
596	29	9	81	5057	..	H.	18 35	53 57	130 57	6	2·30	6
597	27	7	72	5059	R.	..	18 38	49 46	......	..	..	..
	29	7	72	,,	R.	..	....	....	......	..	..	..
598	4	8	71	5060	R.	..	18 39	50 34	......	..	..	..
599	29	7	72	5065	R.	..	18 41	58 5	22 4	4	22·15	4
600	26	9	81	5066	..	H.	18 43	41 9	86 32	6	9·32	6
601	28	10	80	5067	..	H.	18 44	51 5	276 23	6	2·43	6
602	20	9	81	5068	..	H.	18 44	54 27	0 51	6	10·81	6
603	4	8	71	5069	R.	..	18 45	61 59	......	..	..	..
	10	8	71	,,	R.	..	....	....	......	..	..	..

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
564	159	10 10		
565	....	8 8		A 10 magnitude star north following.
566	....	9 9		Too ill-defined to measure.
567	159	9 10		
568	159	9 10		
569	159	8 9		
570	....	6 0		Companion not seen; definition bad.
	....	7		Looked carefully; a 7 magnitude star in a wide cluster; no companion.
	159	6		A 6 magnitude star seen; no companion.
	159	6		Not divided; night is very bad.
	580	6		Round with the highest power; a 9 magnitude star north preceding.
571	159	7 11		
572	159	8 10		Night is too bad to continue observing.
573	159	9 10		
574	150	9 9½	Yellow	Very pretty and well defined.
	159	8 9		
575	....	10 11		Stars are very faint.
576	159	9 0		Companion not found; definition bad.
577	....	....		Companion not found; definition bad.
578	159	8 9		Definition moderate; stars rather unsteady.
579	159	9 10		
580	159	6 0		Companion not seen; 6½ magnitude star north preceding; bad definition.
581	159	9 0		Companion not seen; bad definition.
	....	9	Orange red	Companion only visible by oblique vision, if at all.
582	159	6 6		Seen elongated; position about 90°; definition bad.
	800	....		Wire between them does not cover from centre to centre.
583	159	8 8		
584	....	5 11	Yellow	Can just see to measure this.
585	....	8½ 9		Measured with difficulty; 9 magnitude; star is hazy.
	159	9 10		
586	159	8 8		Difficult; definition pretty good; light bad.
	159	8 8		
587	....	9 10		Fine clear night.
588	....	7 9		Difficult; bad definition.
	....	7 9		Definition at times very bad.
	159	7 10		
589	159	10 10		
590	159	10 10		
591	....	5 12	Orange and blue.	
592	159	7 9		
	159	7 10		A coarse double star; Herschel gives no position or distance.
593	....	10 11		
	159	9 10		
594	159	9 9		Definition horrible, though night looks splendid.
595	159	6 10		Nearly in the same field with 5053.
596	159	11 11		
597	....	....		No. 7 magnitude star with a companion seen here; bad night.
	....	....		No companion found; must be less than 12 magnitude
598	....	....		Not found.
599	150	7 10		Definition good.
600	159	6 10		
601	159	10 11		
602	159	9 11		
603	....	8 12		Saw the small star in glimpses; could not see the large star double.
	....	....		Seen elongated towards small companion. See diagram.

Double Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
603	11	8	71	5069	R.	..	....	....	88e 88 0	.. 6	0·50e 16·04	.. 6
	1	8	81	,,	..		....	....	88 7	6	0·65	6
604	24	7	71	5075	R.	..	18 52	63 59	110 7	6	2·05	6
	23	9	79	,,	..	H.	....	....	107 14	2	1·54	2
	9	8	80	,,	..	H.	....	....	108 35	6	1·64	6
605	30	9	80	5077	..	H.	18 55	36 27	96 17	6	7·49	6
606	20	9	81	5078	..	H.	18 54	45 49	212 50	6	18·46	6
607	25	9	79	5080	..	H.	18 54	36 24	248 15	10	4·88	10
608	16	6	80	5084 γ Cor. Aust.	R.	..	18 59	37 18	53 8	8	1·15	8
	3	9	80	,,	..	H.	....	....	52 22	6	1·32	6
609	5	8	72	5085	R.	..	18 59	00 16	239 26	4	3 30	4
610	15	8	71	4092	R.	..	19 4	47 34	351 0	6	18·20	6
	2	9	80	,,	..	H.	....	....	350 34	6	16·68	6
611	30	9	80	5098	..	H.	19 7	36 27	254 48	7	5·48	6
612	10	9	72	5099	R.	..	19 7	50 12	37 18	4	12·30	4
613	14	8	71	5100	R.	..	19 8	56 22	170e	..	20e	..
614	29	7	72	5108	R.	..	19 12	72 1	......	..	..	..
	3	9	72	,,	R.	..	....	....	......	..	..	..
615	21	9	80	5104	..	H.	19 12	51 16	38 55	6	17·82	6
616	30	9	79	5107	..	H.	19 14	44 46	78 28	10	27·76	10
617	10	8	71	5109	R.	..	19 17	67 30	14 55 141 3	4 6	36·73 23·04	4 6
618	15	9	73	5114	R.	..	19 18	54 34	262 29 95 38	4 2	67·75 70·55	4 2
619	29	9	81	5115	..	H.	19 19	40 7	65 2	6	9·27	6
620	29	9	79	5117	..	H.	19 20	44 12	265 15	10	5·61	10
621	8	9	80	5123	..	H.	19 24	66 41	4 36	6	25·68	6
622	20	8	71	5125	R.	..	19 24	50 11	293 8	6	29·08	6
623	1	10	79	5129	..	H.	19 30	47 7	115 16	10	14·39	10
624	16	9	73	5132	R.	..	19 31	66 35	309 23	6	22·08	6
	12	8	80	,,	..	H.	....	....	300e	..	20e	..
625	14	10	81	5138	..	H.	19 35	44 35	36e	..	12e	..
626	26	7	72	5140	R.	..	19 38	65 13	84 34	4	2·41	4
	29	7	72	,,	R.	..	....	....	83 30	4	2·30	4
	25	9	79	,,	..	H.	....	....	85 7	10	1·52	10
	1	11	80	,,	..	H.	....	....	83 13	6	1·76	6
627	10	9	72	5141	R.	..	19 38	62 9	344 38	4	13·28	4
628	14	10	81	5143	..	H.	19 39	46 44	318 59	6	7·87	6
629	9	10	71	After 5149	R.	..	19 42	55 22	147 5	4	22·74	4
630	7	8	73	5158	R.	...	19 52	74 56	......	..	....	..
631	2	10	79	5159	..	H.	19 52	40 57	33 30	10	23·56	10
632	3	9	72	5162	R.	..	19 55	71 9	......	..	....	..
	10	9	72	,,	R.	..	....	....	292 25	6	6·09	6
	18	8	73	,,	R.	..	....	....	292 12	6	7·10	6
633	26	8	71	5163	R.	..	19 54	63 30	247 48	6	1·57	6
	10	9	73	,,	R.	..	....	....	245 48	4	2·15	4
634	14	10	81	5166	..	H.	19 57	47 11	......	..	....	..
635	11	9	73	5167	R.	..	20 1	64 0	34 39	6	7·61	6
	29	9	79	,,	..	H.	....	....	33 30	10	6·48	10
	29	9	81	,,	..	H.	....	....	34 0	6	6·33	6

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying Power used.	Magnitudes.	Colours.	Remarks.
	159, 230, 580	8 8 8 12	....	Very difficult; large star, double; estimated position 88°; distance 0·5″ by diameter of wire; nearly always looks nebulous.
	580	9 9	....	Small star not seen.
604	....	8 8	....	Very difficult; looks like oval nebula, with two star points; definition bad; the nearest star is one of a small triangle; seems strange Herschel did not say so.
	159	8 8	....	Blurred.
	159	7 7	....	
605	159	9 10	....	
606	159	9 10	....	Herschel's position angle, 313·4°; the large star is double; position 287° 16′; distance 1·00″; 9 and 10 magnitude. R. 317.
607	159	8 10	....	
608	800	....	....	Very close star; definition middling.
	333	6 6	....	
609	....	8 10	....	Pretty cluster. Herschel's 3778 north following.
610	159	8 8	....	
	159	8 8	....	
611	159	10 10	....	
612	150	9 13	....	Sky very white.
613	....	14	....	Companion only seen in glimpses in a dark field; not measured.
614	....	....	Yellow	No companion seen.
	....	....	....	No companion seen; definition bad.
615	159	9 9	....	Definition bad.
616	159	5 7	....	
617	....	8 10	Yellow and blue	Sky very black. See diagram.
	....	8 10	Both yellow	
618	140, 230	7 9 7 12	Bluish white	Definition is bad. See diagram.
619	159	9 9	....	
620	159	8 9	....	
621	159	9 9	....	
622	....	9 9	....	Stars unsteady, but well defined.
623	159	9 9½	....	Light clouds.
624	....	8½ 10	....	About 180° different from Herschel's position; no other double near here.
	159	8½ 10	....	Herschel's position 180° wrong.
625	159	10 12	....	Seen.
626	....	8 8	....	Very bad definition.
	....	....	....	Calm, dark, and thick night; stars seem to have only half their usual light.
	159	8 8	....	
	159	8 8	....	Cirrus very thick.
627	150	8 12	....	
628	159	10 11	....	
629	....	8 8½	Yellow and greenish yellow.	Very pretty object; stars are nearly the same colour; the smaller has a tinge of green.
630	....	10 10	....	Only just visible with lamp-light; too faint to measure; no change apparent.
631	159	9 9½	....	
632	....	8 11	....	Not seen.
	....	8 11	....	Five stars in an elliptic arc precede this double star.
	140	8 10	....	Preceded by an elliptic arc.
633	435	8 9	....	Very hazy; definition very middling.
	140, 230	8 8½	....	Very difficult; the night is hazy and thick.
634	159	6 10	....	Seen.
635	....	8 9	....	Definition very bad.
	159	8 9	....	
	159	9 10	....	

DOUBLE Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination south.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc	No. of observations of distance.
							h. m.	° ′	° ′			
636	8	8	73	5171	R.	..	20 8	64 49	295 49 325 53	4 4	17·82 28·05	
637	3	9	72	5177	R.	..	20 5	57 21	......	..	....	..
	26	8	73	,,	R.	..	....	....	27 55	6	8·62	6
	25	9	79	,,	..	H.	....	....	27 33	10	6·72	10
638	26	9	81	5178	..	H.	20 6	34 24	7 25	6	2·09	6
639	30	9	79	5179	..	H.	20 7	46 29	135 24	10	5·11	10
640	10	10	79	After 5184	..	H.	20 10	40 45	109 40	10	9·38	10
641	13	10	79	5186	..	H.	20 16	77 38	97 21	10	7·09	10
642	6	10	70	5192	R.	..	20 20	87 35	147 32	8	17·71	8
	11	8	71	,,	R.	..	....	....	147 37	6	18·53	6
	2	10	79	,,	..	H.	....	....	325 31	7	18·18	7
643	15	9	73	5193	R.	..	20 17	57 7	331 12	4	17·02	4
	2	11	80	,,	..	H.	....	....	334 37	6	16·27	6
644	3	10	71	5194	R.	..	20 18	69 32	249 3	7	4·29	7
645	1	11	80	5198	..	H.	20 19	36 50	237 14	6	6·13	6
646	3	7	72	ρ Capricorni	R.	..	20 20	18 36	144 21	4	4·52	4
647	6	10	70	After 5201	R.	..	20 23	75 48	16 36	10	18·68	5
	3	10	71	,,	R.	..	....	....	16 5	4	17·60	4
	23	9	79	,,	..	H.	....	....	16 31	10	17·14	10
648	30	9	79	5204	..	H.	20 24	45 50	31 18	10	5·42	10
649	19	10	78	5209 α Indi	R.	..	20 29	47 45	190e	..	0·70e	..
650	29	9	79	5214	..	H.	20 38	75 45	......	..	..	.
	14	10	79	,,	..	H.	....	....	312 33	10	21·97	10
	20	7	80	,,	..	H.	....	....	315 14	6	19·77	6
651	7	10	80	5216	..	H.	20 38	38 0	202 24	6	15·00	6
652	19	10	78	5221	R.	..	20 41	66 10	49 18	2	10·29	2
653	10	9	78	5222	R.	..	20 41	62 55	93 59	6	3·38	6
	22	9	79	,,	..	H.	....	....	96 54	10	2·21	10
	12	8	80	,,	..	H.	....	....	90e	..	4½e	..
654	14	10	79	5224	..	H.	20 42	34 17	165 31	10	19·96	10
655	11	9	73	5231	R.	..	20 47	70 54	113 55	6	7·82	6
656	10	10	79	5232	..	H.	20 47	56 27	9 27	10	24·44	10
657	26	10	81	5234	..	H.	20 48	84 36	......	..	..	..
658	26	8	71	5235	R.	..	20 56	84 48	85 35	6	4·05	6
	30	9	79	,,	..	H.	....	....	90 16	10	2·32	10
	13	10	79	,,	..	H.	....	....	84 45	10	2·51	10
659	22	9	80	5236	..	H.	20 50	38 10	309 16	6	5·01	6
660	14	10	79	5238	..	H.	20 53	44 55	12 56	10	36·58	10
661	29	9	79	After 5238	..	H.	20 54	43 35	74 56	10	57·47	10
662	12	9	73	5243	R.	..	20 58	57 32	95 55	4	24·70	4
663	1	9	71	5245 ? 5235	R.	..	20 56	84 48	......	..	..	..
	18	8.	73	,,	R.	..	....	....	261 59	6	3·83	6
	16	9	73	,,	R.	..	....	....	264 49	6	3·73	6
	27	5	80	,,	R.	..	....	....	266 27	6	3·86	6
	28	5	80	,,	..	H.	....	....	266 47	10	2·62	10
	26	7	80	,,	..	H.	....	....	260e	..	3e	..
	9	8	80	,,	..	H.	....	....	......	..	..	..
664	15	10	73	5246	R.	..	21 1	55 5	129 3	6	3·82	6
	5	10	78	,,	R.	..	....	....	120 32	4	....	..
	19	10	78	,,	R.	..	....	....	122 6	6	3·62	4
	13	10	79	,,	..	H.	....	....	121 29	10	2·23	10
665	10	10	79	5247	..	H.	21 2	49 26	187 59	10	27·50	10
666	1	9	71	5250	R.	..	21 6	64 11	......	..	....	..
	2	9	71	,,	R.	..	....	....	305 36	6	9·71	6

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
636	....	7 10		Definition bad. See diagram.
	....	7 10		
637	....	9 9		Not seen; air very thick; definition not good.
	140	9 9		Definition good.
	159	8 9		
638	159	7 10		Very clear.
639	159	10 10		
640	159	8 8		
641	159	9 9½		
642	230	7 8		Herschel's position, 329° 21′; distance, 17″; magnitude, 8·8. Stars equal angle taken either way.
	....	8 8		Stars dancing.
	159	8 8		Clouds stopped observations.
643	....	7 10½		Follows α Pavonis, not red.
	159	10 11		
644	....	7 13		Beautiful, but difficult; definition pretty good.
645	159	9 10		Light wires.
646	....	6 9½		This is 2099 in h's measures; h's angle 177°.
647	....	7 7½		Clear moonlight; Herschel's position, 17°23′; distance, 18·69″
	....	7 7½	Both yellow	Quite as bright as Herschel's 5194.
	159	7 8		Indistinct.
648	159	8 9		
649	....	8 16		Estimated.
650	159	8 9		Seen; not measured; distance, 30″.
	159	8 10		
	159	8 10		
651	159	9 9		
652	....	10 10		Observed at Woodford, 2200 feet above sea.
653	140	6½ 6½	Both white	Fine double; definition good.
	159	6 6		
	159	7 7		Bad definition.
654	159	5 9		
655	....	8 8		Fine double.
656	159	9 10		
657	159	....		Not found.
658	....	8 8		Seems to be the same as h. 5245.
	159	8 8		
	159	8 8		
659	159	10 10		Haze about.
660	159	9 9		
661	159	6 6		
662	140	10 11		Very faint; only just measurable.
663	....	8 8		Looked carefully; not found; definition bad.
	....	8 8		A fine pair; think Herschel's position must be wrong; declination 30′ too great; or 5235 and 5245 are same star, unless one of those H. saw has since closed up.
	....	7½ 7½	Both white	Ill-defined; light hot wind.
	250	8 8		An 8 magnitude star follows north.
	159	8 8		
	159	9 9		Same as Herschel's 5235.
	159	....		Not found in H.'s position.
664	140	8 8		Definition very bad.
	....	....		
	....	....		
	159	8 8		
665	159	8 9		
666	....	8 9		Seen; definition so bad it is useless trying to measure.
	...	8½ 9	Straw yellow and blue.	

Double Stars observed and

No. of star in this catalogue	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′		″	
667	21	10	79	5254	..	H.	21 8	40 4	182 44	10	57·36	10
668	27	9	70	5256	R.	..	21 11	60 49	152 38	4	30· 9	4
	9	8	80	,,	..	H.	....	....	160e	..	20e	..
669	26	10	81	5257	..	H.	21 11	51 11	276 43	6	13·02	6
670	27	9	70	5258 θ Indi	R.	..	21 12	53 58	286 47	6	3·72	6
	3	10	71	,,	R.	..	....	....	288 14	6	3·85	6
	14	10	73	,,	R.	..	....	....	285 56	6	4·76	6
	3	10	78	,,	R.	..	....	....	288 50	10	4·68	6
	12	8	80	,,	..	H.	....	....	289 33	6	3·68	6
671	28	9	70	5260	R.	..	21 13	72 20	......	..	....	..
672	28	9	70	5261	R.	..	21 17	86 24	201 48	4	5·60	4
	29	10	79	,,	..	H.	....	....	203 43	10	4·18	10
673	26	10	81	5267	..	H.	21 18	45 35	......	..	....	..
674	11	10	71	5270	R.	..	21 19	60 44	40e	..	12e	..
675	14	10	81	5274	..	H.	21 23	35 19	148 50	6	22·91	6
676	9	10	71	5278 λ Octantis	R.	..	21 31	83 20	81 21	5	3·13	5
	20	10	73	,,	R.	..	....	....	79 1	4	3·36	4
677	26	10	80	5286	..	H.	21 35	58 23	88 46	6	6·97	6
678	27	10	79	5288	..	H.	21 35	38 39	57 11	10	19·37	10
679	20	9	80	5289	..	H.	21 37	81 8	47 44	6	14·89	6
680	13	10	73	5292	R.	..	21 37	85 20	......	..	....	..
	20	10	73	,,	R.	..	....	....	152 26	4	5·27	4
681	20	10	73	5294	R.	..	21 35	60 48	192 54	1	....	..
	21	10	73	,,	R.	..	....	....	191 1	6	8·51	6
	14	14	79	,,	..	H.	....	....	189 4	10	7·39	10
682	26	10	81	5296	..	H.	21 40	47 46	2 47	4	39·79	4
683	21	10	79	5299	..	H.	21 47	40 39	241 34	10	41·83	10
684	21	10	70	5301	R.	..	21 48	77 56	204 22	10	11·01	10
685	10	11	80	5302	..	H.	21 49	53 36	348 31	6	12·68	6
686	26	10	81	5303	..	H.	21 49	43 6	47 51	6	24·06	6
687	22	9	80	5305	..	H.	21 49	41 38	246 17	6	19·30	6
688	7	11	79	5308	..	H.	21 50	46 9	313 36	10	18·38	10
689	26	10	80	5309	..	H.	21 49	51 37	167 21	6	8·07	6
690	24	11	80	5315	..	H.	21 59	38 15	152 39	6	22·52	6
691	15	10	73	5316	R.	..	21 58	59 45	145 26	6	5·02	6
692	5	9	70	5318	R.	..	22 6	81 7	117 54	10	9·14	5
	20	9	80	,,	..	H.	....	....	120 27	6	8·58	6
693	10	10	79	5319	..	H.	22 4	38 55	......	..	..	..
	12	11	79	,,	..	H.	22 5	39 4	117 43	10	1·60	10
694	6	10	70	5323	R.	..	22 10	61 28	24 44	13	26·41	13
	4	10	71	,,	R.	..	....	....	24 39	3	26·73	3
	27	10	79	,,	..	H.	....	....	24 9	10	25·57	10
695	29	10	79	5325	..	H.	22 14	73 33	88 50	10	18·74	10
696	19	10	78	5326	R.	..	22 12	37 19	......	..	..	..
	30	11	80	,,	..	H.	....	....	298 45	6	6·74	6
697	9	10	73	After 5326	R.	..	22 14	70 38	......	..	..	..
698	7	12	80	5327	..	H.	22 15	65 44	127 16	6	24·60	6
699	28	10	80	5328	..	H.	22 15	65 45	......	..	..	..
700	11	11	80	5331	..	H.	22 18	63 33	1 59	6	14·91	6
701	10	10	71	5334 γ Toucani	R.	..	22 18	65 40	283 19	6	6·78	6
	7	10	73	,,	R.	..	....	....	286 34	6	6·76	6
	28	10	80	,,	..	H.	....	...	280e	..	..	..
702	24	11	81	5335	..	H.	22 18	45 55	......	..	..	..
703	28	9	70	5338	R.	..	22 20	52 25	......	..	..	..
704	10	10	71	After 5338 γ Gruis	R.	..	22 22	44 28	218 42	2	60·01	2
	11	11	79	,,	..	H.	....	....	212 37	10	60·94	10

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
567	159	8 9	....	
568	....	8 8	....	A very pretty double in the field with this. R. 329.
	159	9 9	....	Another double in the field north preceding.
569	159	9 10	....	
570	230	6 10	....	Small star west; good definition.
	....	5 9	....	Stars are unsteady.
	140	6 7½	....	
	....	....	....	
	159	5 9	....	No third star seen; definition bad.
571	....	6 12	....	Carefully examined; companion not seen.
572	....	9 9	....	Definition middling.
	159	8 8	....	
573	159	....	....	Not found; a 7 and 9 magnitude wide pair 180°e; seen at 46° 30′ S. Dec.
574	....	9 11	....	
575	159	9 9	....	
576	150, 230	5 8	....	Clouds came up.
	....	6½ 9	Both yellow	Splendid definition; calm, clear.
577	159	9 11	....	
578	159	8 9	....	
579	159	9 10	....	
580	....	8 10	....	Companion not seen; definition very bad.
	....	10 11½	....	Only just able to measure this.
581	....	10 11	....	Clouds interrupted observations.
	....	11 11	....	Very faint and difficult, only just able to measure it.
	159	10 10	....	
582	580	5 9	....	
583	159	8 8	....	
584	320	8 11	....	Windy; bad definition; Herschel's position, about 203°; distance, 12″; magnitudes, 9—10.
585	159	8 11	....	
586	159	9 10	....	
587	159	9 9	....	Fog stopped observations.
588	159	9 9	....	
589	159	10 10	....	
590	159	9 9	....	Scud stopped work.
591	150	9 10	....	The northern of two stars.
592	....	9 9	....	High wind; points a little north of ε Octantis.
	159	9½ 9½	....	Points to a 5th magnitude star north proceding.
593	159	....	....	Not found.
	159	8 8	....	
594	....	8 8	....	Herschel's position, 25·8°; distance, 20″; magnitudes, 8—8.
	....	....	....	Clouds stopped observations.
	159	8 8	....	
595	159	8 8	....	
596	....	10 10	....	Seen at Woodford; not measured; 2,200 above sea.
	159	10 10	....	Definition very bad.
597	....	6 9	....	Companion not found; night very good.
598	159	9 10	....	Very indistinct.
599	159	11 12	....	Seen; too faint to measure.
600	159	11 11	....	Ill-defined; bad observations.
601	150	5½ 9	Faint yellow and tinge of green.	
	140	....	....	Definition not good.
	....	....	....	Only double.
602	....	10 10	....	Seen; definition too bad to measure.
	....	7 12	....	Carefully examined; companion not seen.
	150	5½ 9	Bright yellow and blue	Another bright yellow 5½ magnitude star 1′ north of this.
	159	4 9	....	

DOUBLE Stars observed and

No. of star in this catalogue.	Day of the month.	Month of the year.	Year in the 19th Century.	Herschel's number and name.	Observer's initial. R.	Observer's initial. H.	Approximate R.A.	Declination South.	Position angle in degrees and minutes.	No. of observations of position angle.	Distance in seconds of arc.	No. of observations of distance.
							h. m.	° ′	° ′			
705	21	10	79	5339	..	H.	22 25	74 38	......	..	..	..
706	30	9	80	5342	..	H.	22 26	66 42	......	..	..	..
707	24	11	81	5354	..	H.	22 33	58 24	74 45	6	25·42	6
708	10	12	80	5362	..	H.	22 40	47 35	139 6	6	8·96	6
709	21	10	73	5364	R.	..	22 42	57 10	100 9	6	10·34	6
710	7	11	79	5366	..	H.	22 45	43 37	251 30	10	14·67	10
711	21	10	70	5368	R.	..	22 47	85 18	125 51	10	7·79	10
712	10	12	80	5373	..	H.	22 55	64 54	97 38	6	46·96	6
713	25	11	80	5374	..	H.	22 55	73 51	58 17	6	11·92	6
714	30	9	70	5378	R.	..	22 56	83 4	......	..	....	..
	1	10	70	,,	R.	..	....	....	345 7	8	39·95	8
715	14	10	73	5379	R.	..	22 56	57 0	328 18	5	12·55	5
716	25	11	80	,,	..	H.	22 59	75 37	52 47	6	3·11	6
717	12	11	73	5382	R.	..	22 57	52 4	48 13	6	7·71	6
	27	10	79	,,	..	H.	22 58	52 7	50 24	10	6·35	10
718	28	9	70	θ Gruis Jacobs 238	R.	..	23 0	44 12	11 28	2	2·30	2
	5	10	70	,, ,,	R.	..	....	.....	16 44	1	2·30	1
719	27	9	70	After 5383	R.	..	23 0	51 22	258 47	3	8·00	3
	3	10	71	,,	R.	..	....	....	258 37	6	8·56	6
	12	11	73	,,	R.	..	23 0	51 21	257 29	6	8·71	6
	14	10	79	,,	..	H.	23 0	51 23	260 46	10	7·39	10
720	10	11	70	After 5384	R.	..	23 2	60 22	290 56	10	14·29	10
	30	11	81	,,	..	H.	....	....	293 23	6	14·04	6
721	5	10	70	5385	R.	..	23 3	79 0	......	..	....	..
722	25	11	80	5387	..	H.	23 7	41 36	277 52	6	7·43	6
723	3	10	70	5388	R.	..	23 11	81 5	120 6	3	11·30	3
	15	10	70	,,	R.	..	....	....	122 6	10	11·60	10
724	5	10	70	After 5390	R.	..	23 11	61 40	100 55	2	40·65	2
725	10	11	71	5394	R.	..	23 14	51 3	209 58	6	16·10	6
	25	11	79	,,	..	H.	....	....	209 49	10	16·40	10
726	15	11	80	5395	..	H.	23 14	38 18	231 15	6	2·57	6
727	29	10	70	5400	R.	..	23 23	54 59	......	..	....	..
728	9	12	80	5401	..	H.	23 24	52 56	42 16	6	11·97	6
729	15	11	70	5402	R.	..	23 25	69 45	198 24	10	35·92	10
	5	12	81	,,	..	H.	....	....	198 5	6	36·67	6
730	15	10	73	5407	R.	..	23 29	64 48	22 46	4	10·33	4
	25	11	80	,,	..	H.	....	....	22 38	6	9·08	6
731	21	10	73	5411 θ Phœnicis	R.	..	23 33	47 22	271 15	4	4·75	4
732	8	11	70	5414	R.	..	23 36	78 31	261 55	9	8·32	11
	7	12	80	,,	..	H.	....	....	261 15	6	6·64	6
733	8	11	70	5419	R.	..	23 40	72 39	......	..	....	..
	16	11	80	,,	..	H.	23 40	72 38	100 36	6	21·17	6
734	11	11	79	5422	..	H.	23 43	44 10	347 47	10	5·96	10
735	3	10	70	5427	R.	..	23 47	72 52	64 21	1	9·30	1
	7	11	79	,,	..	H.	....	....	60 31	10	8·32	10
736	16	11	80	5430	..	H.	23 48	77 23	55 33	6	20·90	6
737	12	11	79	5432	..	H.	23 49	59 29	87 33	10	21·50	10
738	28	9	70	5437	R.	..	23 54	53 46	......	..	....	..

measured at Sydney Observatory—*continued.*

No. of star in this catalogue.	Magnifying power used.	Magnitudes.	Colours.	Remarks.
705	....	9 11	....	Seen; not measured.
706	159	11 11	....	Seen; too hazy to measure
707	159	8 9	....	
708	159	7 11	....	
709	....	10 10	....	South end of a small triangle.
710	159	8 9	....	
711	100, 320	9 9	....	First two measures with power 100; Herschel's position is 125·5°; distance, 8″; magnitudes, 9–9.
712	159	7 10	....	
713	159	11 11	....	
714	....	9 9	....	Seen; clouds prevented observations.
	....	....	....	Definition good; clouds stopped observations.
715	150	10 10	....	
716	159	10 10	....	
717	140	9 9	Both white.	
	159	9 9	....	
718	....	5 8	....	Good observations.
	....	4 8	....	R. A. S. Journal, vol. 17, page 88. Jacob's catalogue.
719	230	7 7½	....	Definition fair.
	....	7 7½	....	
	140	7½ 8	Both straw yellow ..	Fine and clear.
	159	6 7	....	
720	....	8 11	....	Position doubtful; the first three measures of distance unsatisfactory; Herschel's position, 298·4°; distance, 12″; magnitudes, 8–10.
	159	8 10	....	
721	....	....	....	Not found.
722	159	8 10	....	
723	100	8 12	....	Fine pair; companion not seen with higher power than 100.
	....	8 11	....	Herschel's position, 124·4°; distance, 10″; magnitudes, 8–12. Reflector.
724	....	6 12	....	
725	150	5½ 9	Yellow.	
	159	6 9	....	
726	159	9 10	....	Very badly defined.
727	....	7 13	....	Not seen; light clouds about.
728	159	10 10	....	
729	100	8 11	....	Herschel's position, 202°; distance, 35″; magnitudes, 8–11.
	159	8 10	....	
730	....	10 11	Yellow.	
	159	8 10	....	Herschel's declination is 65° 46′ south.
731	....	7 8	....	Definition got very bad after first two observations.
732	150	8 10	....	Definition improved; Herschel's position, 262·7° distance, 8″; magnitudes, 8–10.
	159	8 10	....	Cloudy.
733	....	....	....	Not found; full moon.
	159	10 10	....	
734	159	10 10	....	Very difficult; light wires.
735	....	9 9	....	Clouds stopped observations.
	159	9 9	....	
736	159	10 11	....	
737	159	9 10	....	
738	....	....	....	Could not see the companion

SYDNEY OBSERVATORY LIST of New Double Stars.

No. and Name.	R.A.	Dec. S.	Position. Measured.	Position. Estimated.	Distance. Measured	Distance. Estimated.	Date of Obser-vations.	Mag.		Colours.	Remarks.
	h. m.	° ′	°	°	″	″					
1	0 0	78 12	......	60	......	......	1871·752	9	14		
2	0 4	72 17	......	30	......	25	80·720	11	12		
3	0 22	66 37	......	120	......	1	73·900	9	10	....	Brighter star of H 3370; has a companion not seen by Herschel.
4	0 28	54 15	91·300	......	3·09	......	73·861	10	11		
5	1 1	60 40	199·417	......	22·91	......	80·407	9	9½	....	First seen, 1870·851; position, 192·433; distance, 23·126.
6	1 16	83 0	......	5	......	15	70·894	14	14		
7	1 16	76 26	......	260	......	10	70·894	10	11		
8	1 16	83 22	......	270	......	20	70·894	11	11		
9	1 17	80 50	......	320	......	1	70·894	13	13		
10	1 21	86 5	......	120	......	12	70·894	12	12		
11	1 38	76 36	126·867	......	1·94	......	73·881	9	9	White	Very fine double; it is the preceding of a triangle, and just in the field south preceding H 3464, and much more difficult; evidently not divided by H.'s reflector.
12 B A C 599	1 52	60 46	35·875	......	2·04	......	82·032	8	8		
13	2 9	63 3	82·753	......	37·40	......	70·897	10	10		
14	2 11	73 13	162·791	......	9·75	......	81·071	9	10		
15	2 11	70 42	136·541	......	11·57	......	70·897	10	11		
16	2 16	60 35	......	140	......	14	73·861	11	11	....	South preceding H 3490 only 15 S.; cannot understand why H. did not see it.
17	2 34	62 11	......	260	......	8	70·897	12	13		
18	2 45	62 5	46·858	......	27·80	......	70·897	11	12		
19	3 12	76 10	......	90	......	4	70·905	12	12		
20	3 12	65 40	......	120	......	25	70·905	11	13		
21	3 12	67 50	......	300	......	20	70·905	12	13		
22	3 12	69 50	......	90	......	3	70·905	11	11		
23	3 13	70 38	......	160	......	15	70·905	12	12		
24	3 13	74 27	......	86	......	20	70·905	11	12		
25	3 13	80 35	......	110	......	20	71·024	11	12		
26	3 15	44 22	38·950	......	44·71	......	79·033	7	8		
27	3 16	69 54	......	260	......	10	81·082	12	13		
28	3 18	70 50	......	......	......	20	70·908	7	12		
29	3 18	70 15	......	230	......	40	81·112	7	13		
30	3 40	80 56	......	......	......	10	75·919	10	11		
31	3 42	78 46	244·017	......	27·04	......	71·013	9	11		

SYDNEY OBSERVATORY LIST of New Double Stars—*continued.*

No. and Name.	R.A.	Dec. S.	Position. Measured.	Position. Estimated.	Distance. Measured.	Distance. Estimated.	Date of Obser-vations.	Mag.	Colours.	Remarks.
	h. m.	° ′	°	°	″	″				
32	3 56	37 20	195·367	......	33·00	......	1881·164	9 10		
33	3 57	37 9	292·717	......	13·46	......	81·164	9 10		
34	4 0	66 30	......	235	......	......	80·021	9 10		
35	4 1	82 50	......	30	......	15	....	10 11		
36	4 1	66 53	......	130 230	....	30 60	80·040	10 10 10		
37	4 4	84 17	......	......	......	......	....	......	....	Suspected double.
38	4 5	85 32	236·412	......	1·58	......	71·048	7 8	Very white ..	First seen, 1871·040.
39	4 6	85 32	207·300	......	41·58	......	81·111	10 11	....	First seen, 1871·048, in field with last star.
40	4 7	60 40	......	200	......	......	80·021	8 8		
41	4 8	60 45	......	80	......	......	80·021	8 9		
42	4 9	69 30	......	......	......	25	71·040	8 8		
43	4 9	73 0	......	......	......	12	71·040	9 9	....	In same field.
44	4 9	73 0	......	......	......	15	71·040	8 9		
45	4 9	78 25	......	......	......	20	71·040	10 10		
46	4 9	83 13	......	......	......	15	71·040	9 11		
47	4 11	85 30	236° 25′	......	1·58	......	71·040	7 8	Both white ..	Measured with 580 power; angle not very different from h. 3631, measured same evening.
48	4 9	85 28	......	......	......	20	71·040	9 10	....	In same field.
49	4 9	83 36	......	......	......	10	71·040	9 10		
50	4 10	81 56	......	210	......	6	71·040	9 10		
51	4 12	85 30	......	......	......	½	....	....	....	Not far from h. 3031 another star looks double.
52	4 15	66 33	......	45	......	30	80·040	7 9		
53	4 21	67 18	......	30	......	30	80·040	8 8		
54	4 37	63 1	98·367	......	32·35	......	79·092	....	....	Mags. not given.
55	4 40	61 28	......	......	......	10	73·903	9 9		
56	5 0	35 35	318·350	......	2·23	......	82·196	5 10	....	Fine double.
57	5 1	65 14	187·383	......	37·81	......	70·109	8 9		
58	5 13	78 20	......	210	......	......	71·026	11 12	....	In same field.
59	5 13	78 20	......	110	......	......	71·026	11 15		
60	5 47	80 40	......	......	......	......	73·078	7 0	....	Suspected double.
61	6 12	67 10	......	......	......	25	71·029	10 10		
62	6 13	73 36	......	......	......	20	71·029	9 11		
63	6 13	71 25	......	......	......	10	71·029	11 11		
64	6 14	66 17	......	......	......	20	71·029	10 10		
65	6 26	50 16	318·033	......	12·50	......	79·185	6 9	....	Large; is a fine double; position, 267° 641″; distance, 72″; power, 580.

SYDNEY OBSERVATORY LIST of New Double Stars—*continued.*

No. and Name.	R.A.	Dec. S.	Position. Measured.	Position. Estimated.	Distance. Measured.	Distance. Estimated.	Date of Observations.	Mag.		Colours.	Remarks.
	° ′	° ′	°	°	″	″					
66	6 32	66 17	......	......	......	20	1871·029	9	10		
67	6 32	77 21	......	......	......	15	71·029	8	8		
68	6 40	55 22	......	......	......	8	74·155	9	12	....	Two smaller stars follow ; nice double.
69	6 40	58 22	353·768	......	4·95	......	79·215	10	11		
70	7 8	72 55	......	90	......	......	72·100	11	11		
71	7 14	44 39	77·465	......	15·39	......	79·248	10	10		
72	7 15	62 57	317·044	......	26·87	......	81·303	9	10		
73	7 16	44 55	183·137	......	9·34	......	81·278	11	11		
74	7 18	52 5	282·354	......	41·97	......	80·437	7	8	....	First seen, 73·191 north and 12s. following h. 3959.
75	7 19	55 6	88·316 79·333	....	5·07 31·82	......	82·155	10 11	11	....	Triple ; three stars nearly in a line.
76	7 19	55 9	261·608	......	26·73	......	80·437	10	11		
77	7 25	61 48	101·783	......	21·03	......	80·440	11	12	....	First seen, 73·174.
78	7 28	60 41	287·090	......	15·50	......	81·303	11	11		
79	7 45	58 45	299·790	......	35·78	......	80·440	9	9½		
80	7 52	53 20	341·175	......	34·61	......	80·347	8	8½		
81	8 4	48 51	34·595	......	15·08	......	80·440	9	9	....	In a cluster ; first seen, 73·180.
82	8 14	62 31	62·256	......	2·60	......	81·349	6	10	....	In field with 4077 on 10/3/82; angle 66° 07″; distance, 3·76″.
83	8 16	58 47	88·108	......	8·54	......	81·355	11	11		
84	8 22	58 44	213·833	......	7·71	......	81·352	10	10		
85	8 24	34 44	145·928	......	23·99	......	81·341	7	10		
86	8 35	45 47	240·220	......	13·91	......	79·328	9	11	....	Diagram shows it in field and south of h. 4122.
87	8 53	52 16	240·517	......	8·47	......	81·256	6	9	Yellow and bluish	
88	8 53	53 20	147·667	......	10·92	......	74·109	8	8	....	A pair seen here, 81·339.
89	8 55	67 44	212·128	......	44·40	......	80·284	7	10		
90	8 56	59 17	......	270	......	8	81·355	9	13	....	Two pairs in the field.
91	8 56	59 17	......	90	......	10	81·355	11	12		
92	9 9	58 0	......	100	......	12	81·256	9	10		
93	9 9	58 0	......	140	......	18	81·256	10	10		
94	9 9	59 22	......	330	......	......	81·256	10	11		
95	9 10	57 34	......	......	......	......	81·256	9		....	Four 9th magnitude stars here with companions.
96	9 10	57 34	......	......	......	......	81·256	9		....	
97	9 10	57 34	......	......	......	......	81·256	9		....	
98	9 10	57 34	......	......	......	......	81·256	9		....	

Sydney Observatory List of New Double Stars—*continued.*

No. and Name.	R.A.	Dec. S.	Position. Measured.	Position. Estimated.	Distance. Measured.	Distance. Estimated.	Date of Observations.	Mag.	Colours.	Remarks.
	° ′	° ′	°	°	″	″				
99	9 11	52 57	......	355	......	12	1881·256	10 10		
100	9 11	52 57	......	60	......	15	81·256	11 11		
101	9 11	51 0	......	340	......	6	81·256	10 11		
102	9 12	55 30	......	45	......	......	81·256	11 11	....	Four pairs in the field. See diagram.
103	9 12	55 30	......	50	......	......	81·256	11 11		
104	9 12	55 30	......	350	......	......	81·256	10 11	....	See diagram R. 104.
105	9 12	55 30	......	280	......	......	81·256	10 11	....	Stars A., B., C., and D.
106	9 12	58 15	......	120 260	....	16 25	81·256	8½ 9 9½	....	Triple. See diagram.
107	9 12	57 52	......	260	......	8	....	9 10		
108	9 12	55 12	......	270	......	8	....	10 10		
109	9 12	49 47	69·728	 340	9·10	 12	81·393	10 10 12	....	Triple. See diagram.
110	9 17	60 13	26·623	......	11·06	......	81·388	10 11		
111	9 17	56 46	209·132	......	8·52	......	80·347	11 12	....	First seen, 1873·174.
112	9 19	48 59	281·050	......	9·95	......	80·333	9 9½	....	First seen, 1880·314.
113	9 19	49 0	......	345	......	15	80·333	10 11		
114	9 20	49 0	......	310	......	15	80·333	11 11		
115	9 21	49 15	......	350	......	18	80·333	10 11		
116	9 21	49 15	......	20	......	18	80·333	10 10½	... .	In same field.
117	9 21	49 15	......	85	......	18	80·333	11 11½		
118	9 22	66 58	......	230	......	10	78·161	10 11		
119	9 27	55 28	18·683	......	16·87	......	73·207	11 11		
120	9 27	55 28	34·483	......	9·59	......	73·207	10 10		
121	9 28	55 29	......	210 160	....	6 10	81·355	10 11 11 12	....	See diagram.
122	9 28	55 26	94·783	......	3·20	......	73·207	9½ 10		
123	9 29	57 23	30·050	......	2·53	......	73·174	8 8	....	This is the following star of a small triangle.
124	9 32	47 29	66·783	......	5·48	......	81·393	10 10		
125 B.A.C. 3298	9 32	48 13	162·250	......	2·12	......	80·314	8 11	....	First observed 1880·289; position, 167°·8; distance 3·42″; magnitudes, 8·10.
126	9 31	48 30	......	310	......	7	80·333			
127	9 31	48 31	286·217 348·057	....	13·11 2·38	....	80·333	7 10 7 7	....	Triple. See diagram.
128	9 36	48 46	290·633	......	35·30	......	80·508	9 10	....	First seen, 1880·333.
129	9 38	55 15	106·483	......	4·12	......	73·174	8 8		
130	9 40	49 0	248·691	......	17·67	......	80·448	8 8	....	First seen, 1880·333.
131	9 41	44 30	......	120		3	81·415	10 10		

Sydney Observatory List of New Double Stars—*continued.*

No. and Name.	R.A.	Dec. S.	Position. Measured.	Position. Estimated.	Distance. Measured.	Distance. Estimated.	Date of Observations.	Mag.		Colours.	Remarks.
	h m	° ′	°	°	″	″					
132	9 46	56 54	159·683	......	7·59	......	1873·174	11	11½		
133	9 46	80 45	224·467	......	·25·13	......	80·402	9	9		
134	9 49	85 27	270·000	......	15·44	......	71·224	8	8½	....	Exactly on wire —270°.
135	9 49	87 10	......	240	......	10	71·224	11	11		
136	9 49	79 56	226·407	......	13·41	......	80·358	8	9		
137	9 49	54 23	47·067	......	14·72	......	73·204	9½	11	Red	A third star forms a curve; distance, a little more than A to B.
138	10 2	55 2	......	270 270	....	4 6	81·256	9½ 10	10 11	....	Triple. See diagram.
139	10 11	66 40	331·717	......	2·75	......	80·489	7	9	....	First seen, 1880 344.
140	10 14	55 29	277·075	......	2·88	......	81·467	8	9		
141	10 15	66 28	37·067	......	2·93	......	80 344	8	9	....	First seen, 1873·224; nearly as close as H. 4306; fine object.
142	10 18	64 40	354·083	......	3·38	......	80·495	8	11		
143	10 21	49 32	21·153	......	17·27	......	81·393	10	11		
144	10 21	49 32	......	20	......	17	81·303	10	11	....	Follows almost in field with the last star.
145	10 21	47 23	264·920	......	24·05	......	80·325	9	11		
146	10 22	54 56	98·670	......	11·62	......	81·467	9	9		
147	10 23	58 7	......	......	......	......	80·344	6½	0	....	First seen, 1874·284. Three stars within 12s. in R.A. and almost exactly in a line when the wire bisects the first and second; the third is 0·5″ south of the line.
148	10 25	47 16	......	275	......	8	80·314	......		....	The star forms the angle of a right-angled triangle; position doubtful.
149	10 25	66 7	134·350	......	4·20	......	80·347	9	10	....	Large star; bright red.
150	10 27	51 40	346·836	......	1 87	......	81·446	9	10		
151	10 27	68 20	191·733	......	3·47	......	80·443	8	10		
152	10 34	63 51	6·751	......	3·02	......	74·287	8½	10		
153	10 35	58 13	70·417	......	15·72	......	71·481	......		Yellow and blue.	
154	10 39	63 37	304·833	......	3·60	......	80·500	9	9	....	First observed, 1880·391; position 306.417; distance, 2·04″; magnitude, 9½—10.
155 μ Argo..	10 40	48 48	5·4638	......	2·81	......	80·825	3	9	Pale yellow and pale green.	First seen, 1880·314.
156	10 41	58 40	208·083	......	2·17	......	76·144	10	10		

SYDNEY OBSERVATORY LIST of New Double Stars—*continued.*

No. and Name.	R.A.	Dec. S.	Position. Measured.	Position. Estimated.	Distance. Measured.	Distance. Estimated.	Date of Observations.	Mag.	Colours.	Remarks.
	° ′	° ′	°	°	″	″				
157	10 43	65 24	55·378	......	8·34	......	1881·464	8½ 11	11m. blue.	
158	10 44	49 13	251·473	......	34·41	......	81·456	9 9		
159	10 44	49 13	279·044	......	43·06	......	81·456	8½ 9		
160	10 45	68 8	234·989	......	7·00	......	81·464	9 10		
161	10 45	56 33	256·038	......	0·50	......	74·183	7 8	....	Four minutes following northerly part, Eta Argus cluster; fine double star; distance seems to be increasing.
			257·250	......	0·72	......	76·128	7 9		
			261·517	......	0·85	......	78 221	7 8		
			258·817	......	1·15	......	80·204	......	Both yellow.	
			261·825	......	1·20	......	82·182	7 9	....	When first seen thinnest wire covered from centre to centre; much wider now.
162	10 47	70 56	228·167	......	10·63	......	80·402	9 9		
163	10 50	58 27	55·217	......	1·80	......	79·237	8 8¾	....	R.A. of this star doubtful.
164	10 54	60 33	82·183	......	4·52	......	73·311	7 12	White.	
165	11 6	46 27	59·450	......	3·15	......	80·317	8 8	....	First seen, 80·314.
166	11 8	54 51	212·539	......	7·39	18	81·484	11 11 12	....	Triple. See diagram.
			......	270	......					
167	11 10	47 21	98·535	......	21·37	......	79·440	11 11		
168	11 17	42 20	125·633	......	3·20	......	71·418	9 9		
169	11 17	54 41	......	70	......	12	81·495	10 12		
170	11 20	55 48	250·014	......	15·49	......	81·495	9 11	....	Discovered and measured, 81·464; position, 248·808; distance, 14·04; magnitude, 9·10.
171	11 21	46 49	350·900	......	2·72	......	80·317	8 11		
172	11 24	55 21	105·570	......	25·12	......	81·495	9 9	....	Discovered and measured, 79·454; position, 106·623; distance, 26·98; magnitude, 9·10.
173	11 31	46 21	149·820	......	2·82	......	81·467	9 10		
174	11 33	82 25	257·717	......	4·38	......	80·382	8 9	....	First seen, 71·489.
175	11 35	60 24	15·363	......	8·37	......	82·150	9½ 11	....	In a cluster B. See diagram. Stars are not all shown? h 4475.
176	11 35	60 24	307·260	......	3·03	......	82·500	......	....	A in diagram.
177	11 28	46 35	157·567	......	3·69	......	80·325	8½ 9	....	First seen, 80·314.
178	11 40	42 40	162·453	......	10·09	......	80·454	9 10	....	First seen, 71·415.
179	11 40	57 28	355·217	......	5·07	......	71·309	9 9	Yellow.	
180	11 41	52 22	180·733	......	2·65	......	73·256	9½ 10		
181	11 52	70 45	108·400	......	10·98	......	80·382	10 10		
182	11 56	84 22	....	......	......	15	71·358	11 11		
183	11 56	76 20	....	......	......	12	71·358	10 11		

SYDNEY OBSERVATORY LIST of New Double Stars—*continued.*

No. and Name.	R.A.	Dec. S.	Position. Measured.	Position. Estimated.	Distance. Measured.	Distance. Estimated.	Date of Observations.	Mag.		Colours.	Remarks.
	° ″	° ″	°	°	″	″					
184	11 56	71 35	209·491	......	24·16	......	1880·456	11	11	....	First seen, 71·358; triple; distance, 12″e, nearly in a line.
185	11 59	61 10	62·000	......	9·34	......	80·402	10	10	....	The preceding point of a small triangle.
186	11 59	61 20	{ 147·900 { 19·167	....	14·40 24·84	....	80·402	{ 7½ { 7½	8 9	....	Triple. See diagram.
187	12 0	60 35	231·800	......	18·00	......	80·426	9½	9½		
188	12 0	84 22	148·337	......	24·43	......	80·456	11	11		
189	12 0	89 14	223·055	......	36·40	......	80·456	11	12	....	First seen, 71·358.
190	12 1	68 13	49·985	......	10·78	......	80·421	10	10	....	First seen, 71,295; position, 60°e; distance, 15″e.
191	12 4	60 21	209·550	......	3·87	......	80·426	9	10	....	First observed, 78·311; position, 212,850; distance, 4·33.
192	12 5	51 37	......	90	......	3	78·284	10	11		
193	12 6	35 25	168·650	......	0·83	......	81·541	8	8		
194	12 7	75 54	0·080	......	13·87	......	80·456	10	11	....	First seen, 71·358; distance, 12″e.
195	12 8	60 21	307·583	......	7·94	......	80·426	10	11	}	In same field.
196	12 8	60 25	276·883	......	8·95	......	80·426	11	11½		
197	12 14	59 40	31·750	......	6·03	......	80·402	10	11		
198	12 15	51 35	50·868	......	2·63	......	80·432	9	10	....	First seen, 78·284; position, 90°e; distance, 3″e; magnitudes, 10 and 11.
199	12 21	57 0	......	280	......	......	80·380	11	12		
200	12 21	60 8	134·917	......	2·99	......	80·429	9	10	....	First seen, 78·284.
201	12 23	61 11	270·467	......	2·43	......	80·382	9	10	Yellow	First seen, 78·284—the most northern of three stars nearly in a line, middle one 7 mag., orange, yellow, and white.
202	12 27	57 10	25·833	......	21·04	......	80·432	11	12	....	First seen, 71·434.
203 β Muscae	12 31	40 13	180·614	......	9·19	......	81·511	9	11		
204	12 31	57 30	100·700	......	18·00	......	80·432	9½	9½		
205	12 32	57 36	271·940	......	23·40	......	81·511	11	11		
206	12 37	55 15	271·917	......	18·58	......	80·432	9	9		
207	12 38	67 17	317·267	......	0·54	......	80·344	4	4½	....	First seen, 78·284; one of the closest doubles I know.
208	12 40	55 10	5·750	......	3·64	......	80·492	10	11	....	First seen, 80·432. First observed, 80·440; position, 6°·033; distance, 3·64.
209	12 41	55 27	193·208	......	1·58	......	80·432	9	10	Light yellow	First seen, 78·278.
210	12 54	33 4	239·150	......	5·83	......	81·541	9	10		
211	12 59	59 20	......	190	......	......	80·426	9	9	....	First seen, 78·284.
212	12 59	61 3	109·400	......	5·80	......	74·456	10	10½	White.	

SYDNEY OBSERVATORY LIST of New Double Stars—*continued.*

No. and Name.	R.A.	Dec. S.	Position. Measured.	Position. Estimated.	Distance. Measured.	Distance. Estimated.	Date of Observations.	Mag.	Mag.	Colours.	Remarks.
	° ′	° ′	°	°	″	″					
213	13 0	59 14	27·079	......	0·33	......	1874·270	8	8	Both orange.	
			19·256	......	0·63	......	80·344	8	8	....	A very beautiful double star; both alike and orange coloured.
			25·750	......	0·70	......	80·426	8	8		
214	13 1	41 46	......	45	......	4″	81·514	11	11		
215	13 8	80 40	......	......	......	......	71·360	10	11		
216	13 8	56 29	129·250	......	5·17	......	80·440	8	10		
217	13 20	57 30	170·900	......	3·38	......	80·429	9½	9½	....	First observed, 74·421; position, 169·983°; distance, 4·17″.
218	13 21	43 11	167·114	......	3·84	......	81·514	9	11		
219	13 22	73 37	23·933	......	13·63	......	80·330	9	12	....	First seen, 71·451; position, 40e; distance, 8″e.
220	13 23	57 56	......	210	......	1″	78·284		......	....	Middle of a remarkable string of stars.
221	13 29	60 30	104·674	......	7·18	......	80·415	11	11	....	First seen, 71·434.
222	13 29	64 16	107·150		1·15	......	79·522	9	9	....	Found, 71·448; may be H 4596 if error of 50′, declination in Cape list.
223	13 31	57 57	......	20	......	......	80·484	6	13		
224	13 31	63 26	{ 212·650 386·417 }	....	{ 8·93 6·70 }	....	804 40	10 10	10	....	Triple. See diagram.
225	13 42	58 56	341·325	......	9·12	......	81·484	10	11		
226	13 45	73 16	133·767	......	16·12	......	80·418	9	9	....	First seen, 71·432.
227	13 48	53 33	348·466	......	1·08	......	80·418	5	6	Both yellow.	First seen, 78·432. The most northerly of several stars; one yellow, another red.
228	13 50	55 48	346·364	......	14·54	......	81·563	9	11		
229	13 52	72 20	116·711	......	6·80	......	80·492	9	10	....	First seen, 71·432; four wide pairs in field here.
230	13 53	61 48	154·100	......	......	......	80·322	8	8 8	....	Three 8 magnitude stars in a line; distance, A to B, 36″; B to C, 43″; when examined with power of 800 they seem in a straight line at times; the following one seems to be ¼ of a second on the following side of the line. First observed, 71·432; position, 154·100; taken as a test object for change.
231	13 53	66 43	160·000	......	3·86	......	80·492	9	9½		
232	13 53	66 34	175·631	......	4·99	......	80·492	9	9		

SYDNEY OBSERVATORY LIST of New Double Stars—*continued.*

No. and Name.	R.A.	Dec. S.	Position. Measured.	Position. Estimated.	Distance. Measured.	Distance. Estimated.	Date of Observations.	Mag.	Colours.	Remarks.
	° ′	° ′	°	°	″	″				
233	13 54	62 0	86·500	......	14·18	......	1880·493	10 11	....	First seen, 71·432.
234	13 54	66 22	176·900	......	6·15	......	74·489	9½ 9½		
235	13 54	74 50	271·491	......	36·17	......	80·508	10 10	....	First seen, 71·432.
236	13 55	57 1	14·350	......	13·78	......	80·514	9 11	....	First seen, 71·432.
237	13 55	57 0	66·750	......	13·01	......	80·514	9 11		
238	13 59	57 8	279·817	......	19·95	......	81·588	9 11	....	In the field with h 4645.
239	13 59	57 8	311·483	......	13·25	......	81·588	9 10		
240	14 1	72 29	208·322	......	32·02	......	80·511	9 9		
241	14 2	72 29	110·103	......	25·00	......	80·511	10 11		
242	14 3	75 38	217·208	......	7·84	......	80·495	10 11		
243	14 14	79 36	123·983	......	5·36	......	80·355	9½ 9		
244	14 15	47 47	125·825	......	3·95	......	81·533	8 11		11 mag.; blue.
245	14 21	61 50	249·320	......	21·22	......	80·492	11 11	....	Two pairs; first seen, 71·443; distance, 2″ e and 15″ e.
246	14 21	61 50	......	......	......	2	71·443	......		
247	14 22	75 47	322·400	......	......	8	80·355	9 9½	....	First seen, 71·443.
248	14 27	46 8	291·374	......	5·50	......	74·432	9 10	....	Fine double.
249	14 28	62 3	33·633	......	2·77	......	81·601	8 10		
250	14 42	69 52	21·808	......	40·55	......	70·741	7 10	Red and blue.	
251	14 45	69 56	236·403	......	26·78	......	80·495	8 11		
252	14 46	69 56	260·891	......	19·52	......	80·495	11 11		
253	14 46	69 58	......	330	......	15	80·574	10 11		
254	14 46	69 58	......	150	......	4	80·574	10 11		
255	14 50	69 29	335·483	......	5·65	......	72·582	7 9		
256	14 54	71 42	42·080	......	1·68	......	80·519	7 9	....	First seen, 72·517.
257	14 57	61 17	......	35	......	6	81·601	10 11	....	In the same field.
258	14 57	61 17	......	80	......	2	81·601	11 11	....	
259	15 6	55 19	338·788	......	16·90	......	79·577	9 10	....	Power used, 159; measures 71·481; angle, 340·40; distance, 16·90.
260	15 25	60 7	334·903	......	18·24	......	80·533	11 12	....	First seen, 72·566.
261	15 25	72 36	90·808	......	7·58	......	74·522	10 10	....	
262	15 26	80 10	271·110	......	5·72	......	74·522	10 10	....	Found on the date measured. Measures again 80·519; angle, 273·889; distance, 6·45″.
263	15 27	63 8	......	45	......	12	72·566	10 11		
264	15 27	68 25	......	210	......	10	72·566	10 11	....	Northern of three stars in line.
265	15 28	80 0	274·024	......	4·70	......	80·519	10 10	....	Precedes h. 4787 about half a field.
266	15 32	79 16	......	......	......	15	71·464	11 11	....	In same field as h. 4787.

Sydney Observatory List of New Double Stars—*continued.*

No. and Name.	R.A.	Dec. S.	Position. Measured.	Position. Estimated.	Distance. Measured.	Distance. Estimated.	Date of Observations.	Mag.	Colours.	Remarks.
	° ′	° ′	°	°	″	″				
267	15 36	65 5	151·742	......	2·79	......	1880·426	7 7	....	First observed, 71·579; position, 158·800; distance, 2·61.
268	15 47	65 21	158·007	......	5·71	......	81·540	9 9		
269	15 50	65 37	134·200	......	2·43	......	72 579	9 9½	....	Second observation, 81·549; position, 131·317; 1·91″ distance.
270	15 53	57 26	59·833	......	10·32	......	80·533	10 11		
271	15 55	33 55	41·156	......	5·61	......	80·653	9 10		
272	16 3	53 50	162·617	......	4·70	......	71·585	9½ 9½		
273	16 4	53 55	166·472	......	10·41	......	80·519	11 11½	....	First seen, 71·585, 6s. following h. 4835.
274 δ Tri Aust	16 4	63 23	......	140	......	0·3	80·404	4 11		
ν Scorpii ..	16 8	19 9	257·050	......	0·53	......	78·270	4 9	....	This is Burnham's close companion.
			1·750	......	0·50	......	78·538			
275	16 9	64 6	349·979	......	4·53	......	74·511	9½ 10	....	Fine double; second observation, 81·547; position, 352·591; 3·83″ distance.
276	16 15	63 43	......	45	......	7	71·527	12 12	....	Two pairs in field with Iota Tri. Aust.
277	16 15	63 43	......	45	......	15	71·527	11 13	....	
278	16 16	63 45	19·700	......	21·66	......	80·432	7 10		
279	16 18	63 53	......	270	......	10	80·571	9 9		
280	16 20	65 0	37·767	......	9·85	......	80·432	9 9½		
281	16 25	61 28	123·383	......	3·76	......	80·404	9 10		
282	16 33	60 40	124·133	......	3·80	......	71·604	6½ 7	Faint yellow	Very pretty double.
283	16 35	35 31	87·850	......	0·42	......	81·629	7 9		
284	16 38	67 23	25·467	......	6·58	......	73·615	9½ 9½		
285	16 44	46 50	......	135	......	30	71·527	10 10	....	Distance very uncertain; follows h. 4890.
286	16 48	37 0	318·382	......	17·13	......	81·629	8 11		
287	16 50	58 41	131·017	......	3·06	......	71·607	8 8		
288	16 53	48 46	55·600	......	1·99	......	81·659	10 11		
289	16 55	50 56	158·000	......	......	5	80·537	8 12	....	New star in the pentagon, h. 4900.
290	17 0	52 15	155·060	......	12·09	......	80·574	9 10	....	First seen, 73·514.
291	17 2	68 14	199·983	......	3·42	......	72·599	9½ 11		
292	17 3	60 38	......	170	......	6	72·579	12 12		
293	17 3	68 0	......	185	......	6	72·579	9 11		
294	17 4	54 16	298·111	......	14·11	......	80·577	9 9	....	First seen, 71·582.
295	17 4	60 50	......	 250	....	6 13	80·577	12 12 12	....	See diagram.
296	17 6	38 7	138·817	......	2·34	......	80·757	7 10		
297	17 10	46 26	0·338	......	3·66	......	80·757	7 10		
298	17 11	34 51	224·383	......	1·77	......	77·643	7 9	....	Large star of h. 4935.

SYDNEY OBSERVATORY LIST of New Double Stars—*continued.*

No. and Name.	R.A.	Dec. S.	Position. Measured.	Position. Estimated.	Distance. Measured.	Distance. Estimated.	Date of Observations.	Mag.		Colours.	Remarks.
	° ′	° ′	°	°	″	″					
209	17 13	59 52	338·750	......	11·52	......	1880·593	10	11	....	First seen, 73·467; magnitudes, 9·9.
300	17 14	58 57	349·600	......	9·48	......	73·473	9	11	....	First seen, 72·473.
301	17 15	75 36	......	170	......	12	72·473	10	12		
302	17 25	81 50	72·150	......	10·68	......	73·538	9	9	....	First observed, 72·579; position, 72·917; distance, 10·40.
303	17 35	53 6	109·664	......	2·54	......	80·566	7	9		
304	17 48	55 23	82·500	......	2·72	......	80·651	9	10	....	First seen, 80·577.
305	17 49	78 58	121·050	......	9·45	......	72·599	9½	9½		
306	17 50	35 55	14·817	......	2·59	......	80·766	8	10		
307	18 7	35 35	355·673	......	1·71	......	80·766	9	10	....	
308	18 21	66 22	295·150	......	4·21	......	79·519	8	10	Yellow & blue	Position. Distance. First observation 73·612..295·233..5·02 Second* " 78·790..288·717..3·79† Third " 81·547..295·987..4·91 Fifth " } 81·549 { 295·767..5·02 Sixth " } 81·549 { 296·400..5·01 * Third in list. † Made at Woodford.
309	18 32	55 57	216·916	......	3·21	......	71·541	7	9		
310	18 32	50 49	16·750	......	32·58	......	71·541	6	10	....	Nearly in same field with preceding pair.
311	18 32	83 47	117·817	......	9·80	......	71·667	9	9½		
312	18 33	47 46	329·164	......	15·58	......	80·596	9	10		
313	18 36	50 32	......	45	......	40	80·596	7	10		
314	18 36	73 4	260·283	......	1·02	......	80·796	6	10		
315	18 37	47 45	......	......	......	12	71·588	9	10		
316	18 44	67 42	......	120	......	40	71·604	11	11		
317	18 54	45 49	287·267	......	1·00	......	81·716	9	10	....	Large star of h. 5078.
318	18 55	67 15	......	160	......	8	80·604	11	12		
319	19 32	73 14	54·400	......	8·56	......	71·615	9	10		
320	19 33	66 20	......	180	......	20	80·612	9	9½		
321	20 19	37 47	97·050	......	1·07	......	80·859	7	9		
322	20 27	75 49	17·024	......	17·96	......	71·667	7	8	Yellow.	
323	20 31	63 8	321·564	......	2·72	......	80·612	9	10	....	First seen, 73·689.
324	20 31	85 10	......	{ 40 { 45	....	10 14	} 80·604	9 11	11	....	Triple; near a red star. See diagram.
325	20 42	56 53	109·617	......	9·20	......	73·785	9½	9½	Faint blue ..	A tenth mag. star; precedes 14 seconds and 5″ north.
326	20 43	40 9	......	300	......	12	80·837	8	12		
327	20 55	55 50	211·617	......	12·95	......	73·694	9½	10		

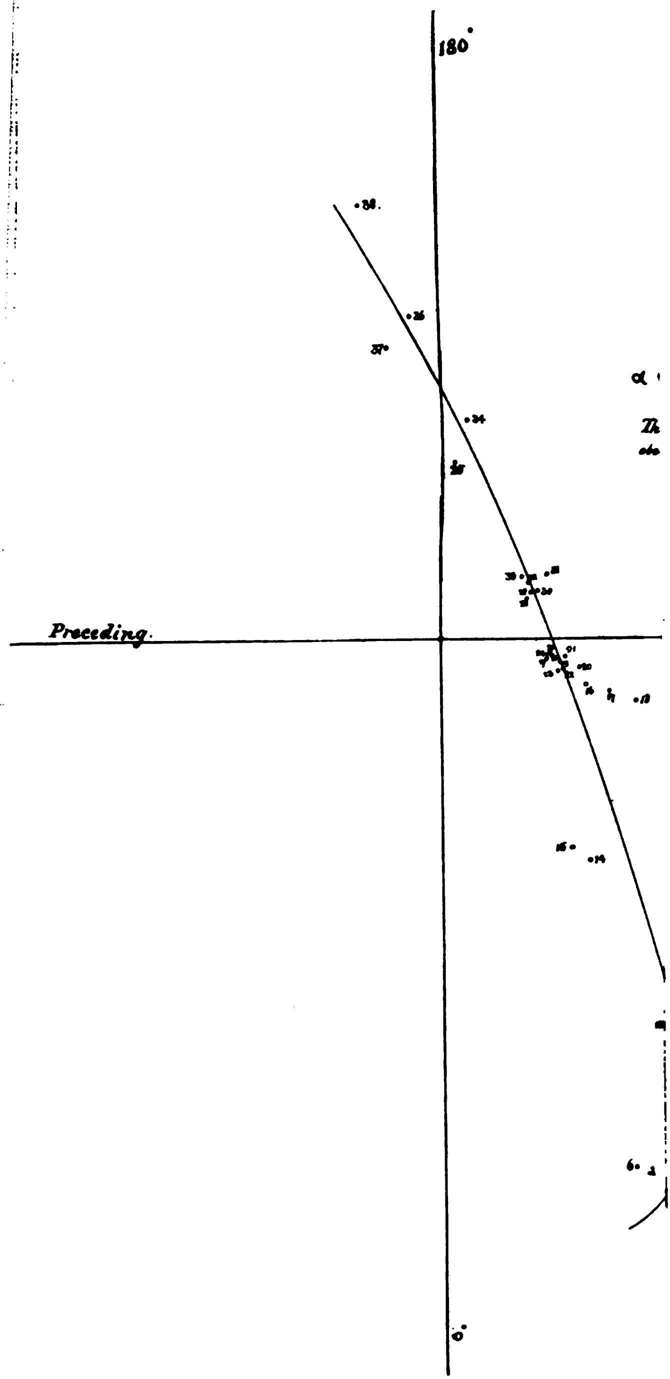
Sydney Observatory List of New Double Stars—*continued.*

No. and Name.	R.A.	Dec. S.	Position. Measured.	Position. Estimated.	Distance. Measured.	Distance. Estimated.	Date of Observations.	Mag.	Colours.	Remarks.
	° ′	° ′	°	°	″	″				
328	21 10	60 45	......	110	......	14	1880·604	10 10	....	In the field with h. 5256.
329	21 10	60 36	115·700	......	20·50	......	70·736	9 9	....	Precedes h. 5256 by 65s. and 5′ farther south.
330	21 11	67 26	2·017	......	5·62	......	70·736	9 12		
331	21 19	55 44	109·717	......	31·45	......	80·615	8½ 8	....	First seen, 71·744.
332	21 20	60 47	333·725	......	14·40	......	80·615	10 11	....	First seen, 71·744.
333	21 22	86 24	80·008	......	6·07	......	73·705	8 8		
334	21 28	83 20	112·167	......	2·82	......	78·790	9 10	Blue and white	
335	21 35	61 25	......	130	......	......	73·799	11 11		
336	23 42	85 22	......	145	......	12	73·799	11 11	....	Precedes h. 5292 about 30s.
337	21 49	88 50	......	......	......	10	70·801	12 12		
338	21 52	89 0	......	200	......	10	71·289	10 10	....	Very faint.
339	22 35	65 20	248·767	......	11·14	......	73·785	9 10	....	The northern of two stars.
340	22 52	77 51	......	120	......	13	70·801	13 14		
341	23 1	72 38	......	70 60	....	12 20	70·856	11 12 14		Triple.
342	23 1	84 53	......	......	......	15	70·856	11 14		
343	23 11	58 51	337·069	......	15·58	......	80·875	8 10	....	A third magnitude star north preceding.
344	23 17	54 25	211·164	......	25·75	......	80·941	7 8		
345	23 25	81 42	......	......	......	12	70·870	11 11	....	Verified 80·746; estimated angle, 110e.
346	23 25	79 20	......	140	......	20	70·870	10 10		
347	23 31	65 44	......	......	......	30	73·785	7 10	Yellow	
348	23 33	69 45	350·283	......	4·16	......	70·870	8 9	Greenish yellow.	
349	8 46	64 55	......	130	......	5	82·274	8 12	Blue.	
350	9 13	57 51	......	270	......	6	82·290	9 10	....	About a dozen doubles near this.

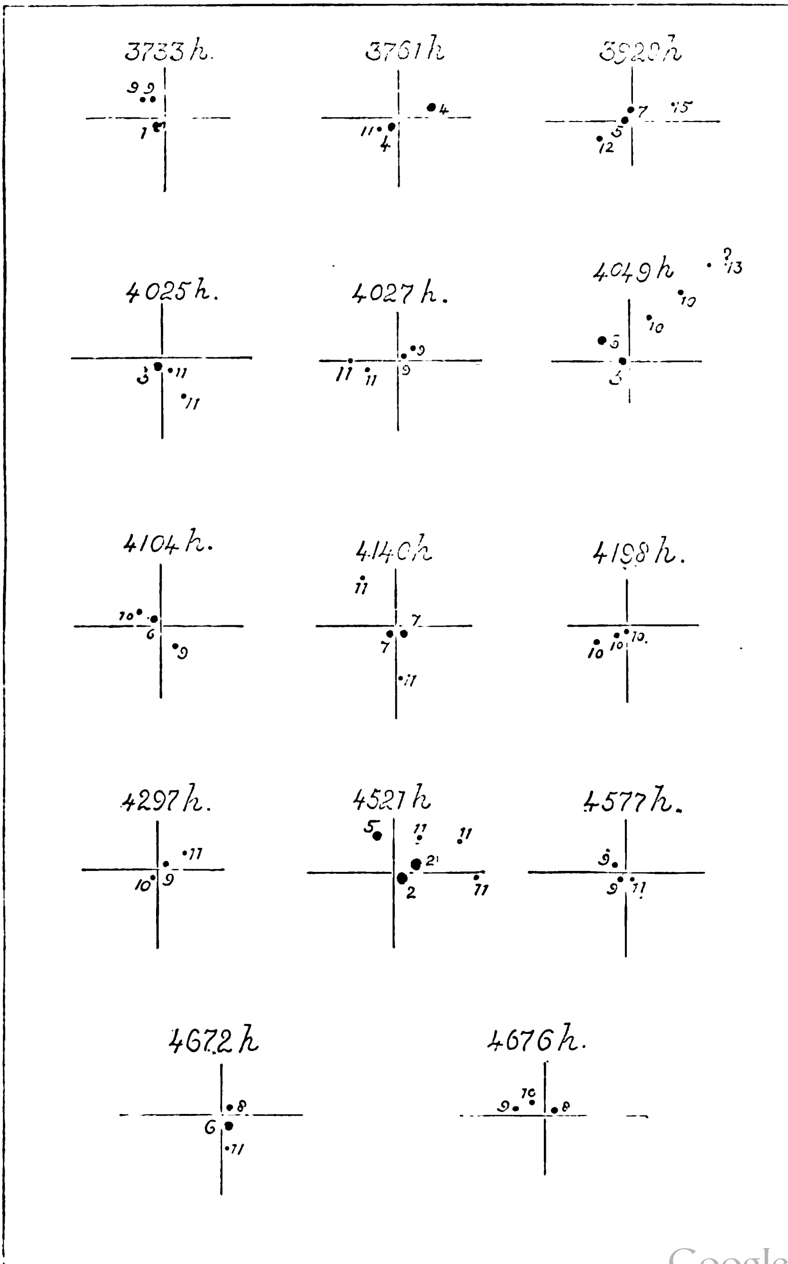
TABLE showing Day and Fraction of the year.

January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
day.	frac.	day.	frac.	day.	frac.	day.	frac.	day.	frac.	day.	frac.	day.	frac.	day.	frac.	day.	frac.	day.	frac.	day.	frac.	day.	frac
1	·000	1	·085	1	·162	1	·246	1	·329	1	·413	1	·496	1	·580	1	·665	1	·747	1	·832	1	·91
2	·003	2	·088	2	·164	2	·249	2	·331	2	·416	2	·498	2	·583	2	·668	2	·750	2	·835	2	·917
3	·006	3	·090	3	·167	3	·252	3	·334	3	·419	3	·501	3	·586	3	·671	3	·753	3	·838	3	·920
4	·008	4	·093	4	·170	4	·255	4	·337	4	·422	4	·504	4	·589	4	·674	4	·756	4	·841	4	·923
5	·011	5	·096	5	·173	5	·257	5	·340	5	·424	5	·507	5	·591	5	·676	5	·758	5	·843	5	·925
6	·014	6	·099	6	·175	6	·260	6	·342	6	·427	6	·509	6	·594	6	·679	6	·761	6	·846	6	·928
7	·016	7	·101	7	·178	7	·263	7	·345	7	·430	7	·512	7	·597	7	·682	7	·764	7	·849	7	·931
8	·019	8	·104	8	·181	8	·266	8	·348	8	·433	8	·515	8	·600	8	·685	8	·767	8	·852	8	·934
9	·022	9	·107	9	·183	9	·268	9	·350	9	·435	9	·518	9	·602	9	·687	9	·769	9	·854	9	·936
10	·025	10	·110	10	·186	10	·271	10	·353	10	·438	10	·520	10	·605	10	·690	10	·772	10	·857	10	·939
11	·027	11	·112	11	·189	11	·274	11	·356	11	·441	11	·523	11	·608	11	·693	11	·775	11	·860	11	·942
12	·030	12	·115	12	·192	12	·277	12	·359	12	·444	12	·526	12	·611	12	·695	12	·778	12	·862	12	·945
13	·033	13	·118	13	·194	13	·279	13	·361	13	·446	13	·528	13	·613	13	·698	13	·780	13	·865	13	·947
14	·036	14	·121	14	·197	14	·282	14	·364	14	·449	14	·531	14	·616	14	·701	14	·783	14	·868	14	·950
15	·038	15	·123	15	·200	15	·285	15	·367	15	·452	15	·534	15	·619	15	·704	15	·786	15	·871	15	·953
16	·041	16	·126	16	·203	16	·288	16	·370	16	·455	16	·537	16	·622	16	·706	16	·789	16	·873	16	·956
17	·044	17	·129	17	·205	17	·290	17	·372	17	·457	17	·539	17	·624	17	·709	17	·791	17	·876	17	·958
18	·047	18	·131	18	·208	18	·293	18	·375	18	·460	18	·542	18	·627	18	·712	18	·794	18	·879	18	·961
19	·049	19	·134	19	·211	19	·296	19	·378	19	·463	19	·545	19	·630	19	·715	19	·797	19	·882	19	·964
20	·052	20	·137	20	·214	20	·298	20	·381	20	·405	20	·548	20	·633	20	·717	20	·800	20	·884	20	·967
21	·055	21	·140	21	·216	21	·301	21	·383	21	·468	21	·550	21	·635	21	·720	21	·802	21	·887	21	·969
22	·058	22	·142	22	·219	22	·304	22	·386	22	·471	22	·553	22	·638	22	·723	22	·805	22	·890	22	·972
23	·060	23	·145	23	·222	23	·307	23	·389	23	·474	23	·556	23	·641	23	·726	23	·808	23	·893	23	·975
24	·063	24	·148	24	·225	24	·309	24	·392	24	·476	24	·559	24	·643	24	·728	24	·810	24	·895	24	·977
25	·066	25	·151	25	·227	25	·312	25	·394	25	·479	25	·561	25	·646	25	·731	25	·813	25	·898	25	·980
26	·068	26	·153	26	·230	26	·315	26	·397	26	·482	26	·564	26	·649	26	·734	26	·816	26	·901	26	·983
27	·071	27	·156	27	·233	27	·318	27	·400	27	·485	27	·567	27	·652	27	·737	27	·819	27	·904	27	·986
28	·074	28	·159	28	·236	28	·320	28	·403	28	·487	28	·570	28	·654	28	·739	28	·821	28	·906	28	·988
29	·077	..	....	29	·238	29	·323	29	·406	29	·490	29	·572	29	·657	29	·742	29	·824	29	·909	29	·991
30	·079	..	....	30	·241	30	·326	30	·408	30	·493	30	·575	30	·660	30	·745	30	·827	30	·912	30	·994
31	·082	..	....	31	·244	..	....	31	·411	..	....	31	·578	31	·663	..	....	31	·830	..	....	31	·997

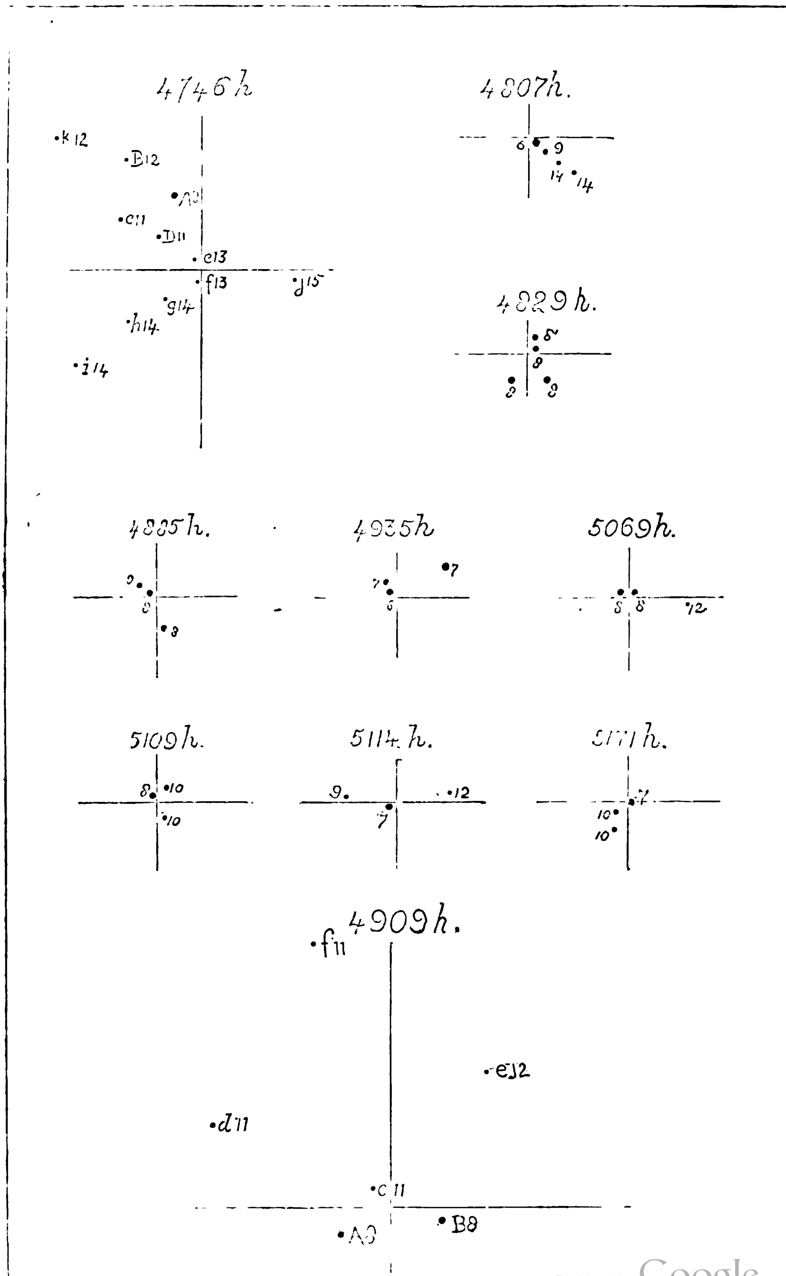
[Four diagrams.]


180°
Preceding.
0°

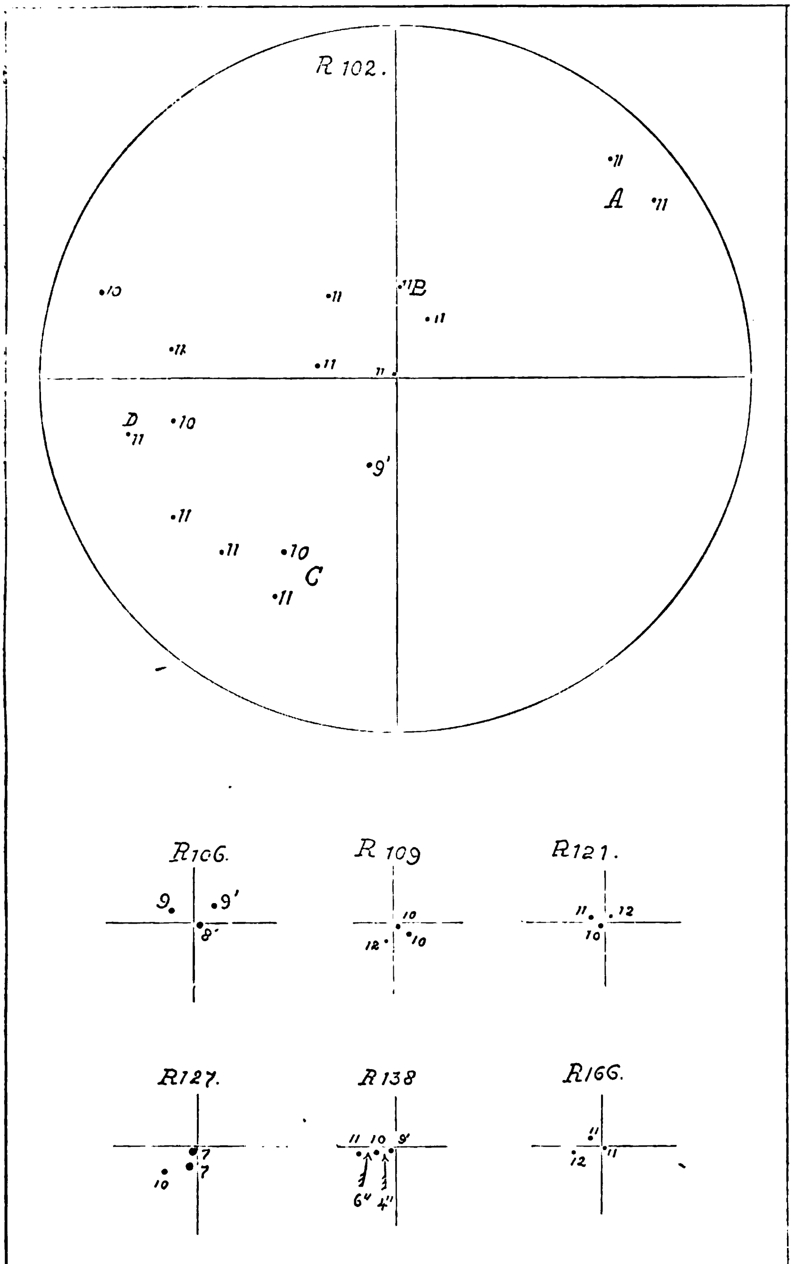
Diagrams of Triple Stars and Clusters.—I.



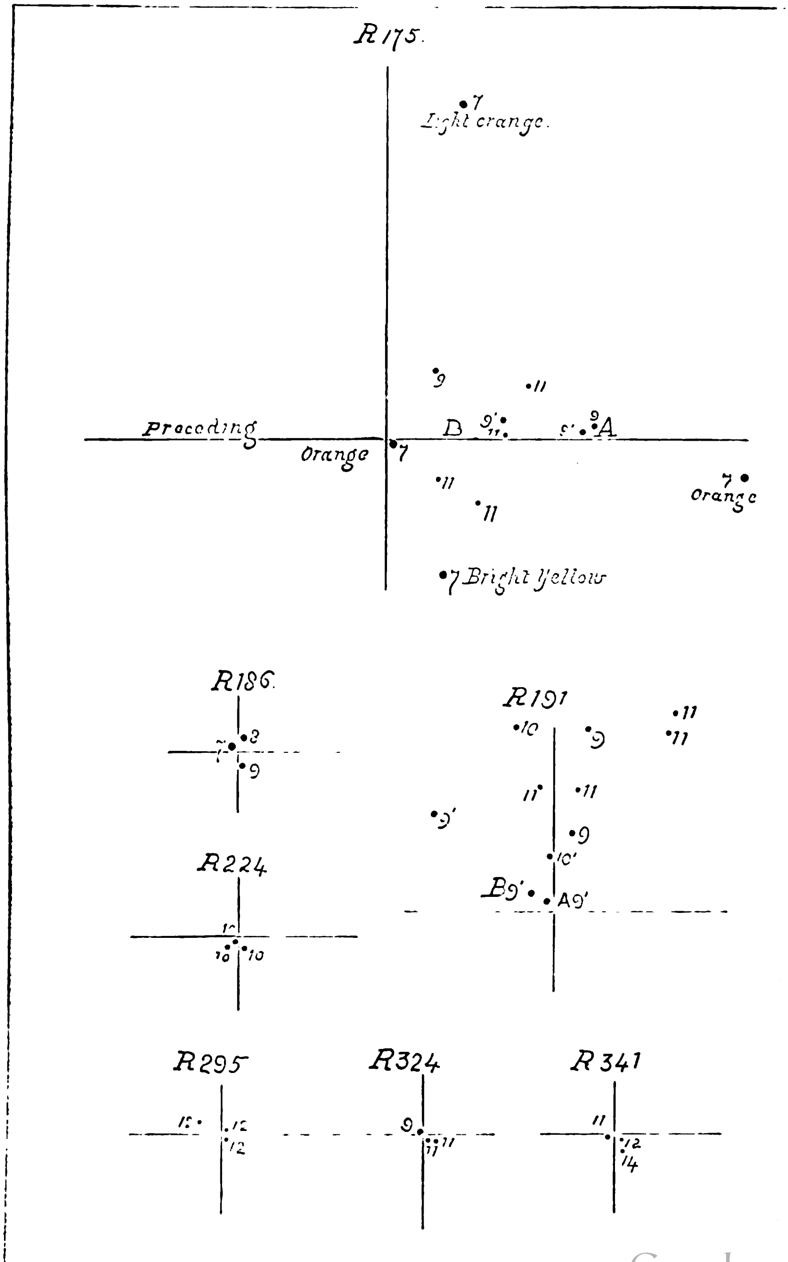
Diagrams of Triple Stars and Clusters.—II.



Diagrams of Triple Stars and Clusters.—III.



Diagrams of Triple Stars and Clusters.—IV.



Transit of Mercury, November 8th, 1881.

By H. C. Russell, B.A., F.R.A.S., Government Astronomer.

[*Read before the Royal Society of N. S. W., 7 December, 1881.*]

A Transit of Mercury is not of so much value for determining the sun's distance as a transit of Venus, nevertheless observations of Mercury in transit have an important bearing on the question, because they afford almost the only teaching which an observer can get in the very difficult task of determining the precise moment when the limbs of the sun and planet make contact; for the long interval between the transits of Venus render practice upon that planet impossible. In an ordinary lifetime, however, an observer may have the chance of seeing several transits of the inner planet, and thus gaining by experience the knowledge required for the observation of Venus in transit. And this is not all: there are several important questions to be answered as to the phenomena of the transit of Mercury itself; for be it remembered that, in this matter, what one or two or even several observers see is not necessarily a fact, and it is only by collecting the testimony of a number of trained observers furnished with good instruments that we can distinguish the subjective from the objective. I may illustrate my meaning by reference to comparatively recent transits. That of 1868 was observed by many persons in England, and little is said about anything except the phenomena of the contacts, but Dr. Huggins, observing with a first-class 8-inch refractor and polarizing eyepiece, saw a bright white star-like spot near the centre of Mercury throughout the transit, and he also saw an aureola of light a little brighter than the sun surrounding the planet. The breadth of this luminous annulus was about one-third the planet's apparent diameter; these he continued to see until the egress of the planet. In giving an account of this, Dr. Huggins points out that the ring of light was seen in 1736 by Plantade, and by other observers since, and that a bright spot had been seen on the planet in the transit of 1799 by Schröter and others. The effect of this was that in the transit of 1878 every one looked for the white spot and halo, and almost every one saw both. One observer saw *two* white spots; the majority saw a *diffused* white spot. Dr. Huggins saw a star-like point, some saw the halo brighter than the sun, but many speak of it as darker. Mr. Proctor saw it as a narrow bright ring, a mere thread,

distant from the planet one-third of Mercury's diameter. All who express an opinion think the phenomena recorded are subjective.

It is obvious therefore that with regard to the phenomena of Mercury in transit there is much yet to be decided, and every opportunity should be taken to clear up these uncertainties. On looking about me as to the means at my disposal for observing Mercury last month, I found that I could command six telescopes, having respectively apertures of 11½, 7¼, 4¾, 4¾, 4¼, and 3¾; and in order to secure observations in the event of cloudy weather I determined to divide the observers into three parties, and put so many miles between them that if one lot had cloudy weather the others might fairly look for fine. The inland stations selected were, (1) a point on the western railway 66 miles from Sydney and 3,400 feet above the sea, and (2) a spot near Bathurst with an elevation of about 2,400 feet. My object in selecting these elevated stations was of course to have the benefit of clearer air as well as the distance from Sydney. At Bathurst Mr. Conder, chief of the Trigonometrical Branch of the Survey Department, used the 4¾ Schröder telescope kindly lent for the occasion by the Surveyor General; and Mr. Brooks, trigonometrical surveyor, used a 3¾-inch which was at one time the transit instrument in the Observatory, but was equatorially mounted for the occasion. At Katoomba Mr. Hargrave, who is double star observer at the Observatory, used a 4¾-inch Simm's equatorial, and Mr. Bladen used a 4¼ Cooke equatorial. In Sydney I used the 11½-inch Schroeder refractor with polarizing eye-piece, and Mr. Lenehan used the 7¼-inch Merz. At ingress, however, owing to the top of the tower coming in the way of the 11½-inch, I could not use it, and therefore took the Merz equatorial, while Mr. Lenehan used a 3¼-inch equatorial hurriedly mounted.

With the exception of the 11½-inch, which has a polarizing eye-piece, all the telescopes were provided with reflecting solar eye-pieces and two coloured shades which afforded sufficient change, except in Mr. Conder's instrument, in which unfortunately one of the coloured glasses was cracked and rendered useless. With this exception, the provision for varying intensity of sunlight was quite sufficient, and on that day, owing to passing clouds, the variation was considerable.

In the matter of time, as both stations were on the Telegraph Line, and the Superintendent of Telegraphs had connected the observing stations with the Observatory, I determined to disregard local observations for time, and by sending clock signals immediately before and after the transit to secure perfectly accurate Sydney time.

And for the geographical position of the observing stations—a matter which at the transit of Venus involved considerable

delay—the triangulation of the Colony is so far advanced that we were able to connect directly with fixed points in the main triangulation, thus securing accurate positions with very little trouble.

Under favourable circumstances Mercury has been frequently seen projected on the light about the sun just before ingress, but on this occasion, although we were all on the watch for it, no one was so fortunate as to see it; in Sydney the weather was so unfavourable that I am not surprised at this, and probably from the rapid subsequent formation of clouds the air inland was also unfavourable; certain it is, however, that we did not see it, and no one caught first contact until there was so much of it that he felt he was late. Such was my own case at 8h. 21m. 34s. I thought I caught it, but the sun became so disturbed that I lost it, and at 8. 21. 44 found it so decided that I knew I was late. Mr. Lenehan made the time 8. 22. 8.; Dr. Wright, 8. 21. 20.; Mr. Morris, 8. 22. 15.; Mr. Hargrave, 8. 22. 0.; Mr. Bladen 8. 22. 3.; Mr. Conder, 8. 22. 5.; Mr. Brooks, 8. 22. 3.; a sufficient variety to prove the difficulty of catching the first external contact. It will, however, be observed that the four on the high land are within 5 seconds of the same time, and two are alike.

For the second contact, and taking the observers in the same order, we have 8h. 23m. for all, and the seconds run, 39.14; 43.00; 10.00; 46.00; 41.33; 42.84; 35.75; 36.45. My time was unsatisfactory owing to bad definition, and Mr. Lenehan's was taken with an inferior telescope; at Katoomba the observations agree very well, and the same at Bathurst, but the two places differ by 6 seconds, which is a considerable interval of time; owing however to the slow movement of Mercury this only represents a motion equal to about half a second of arc, a quantity so small as to be invisible unless under the most favourable conditions of atmosphere and telescope. Mr. Conder's observation was made under these favourable conditions, and he has great confidence in its accuracy; in this he is borne out by Mr. Brooks; and if we bear in mind that the effect of unfavourable conditions is not to make the observer too soon but too late, it seems probable that the others are all a little too late. It is perhaps worth mentioning, to show the imperfection of the planetary tables, that the predicted time for this first internal contact is 8h. 22m. 59s., that is, 36.75 seconds before the earliest observer, and 41.65 before the mean of the seven observers.

At egress, last internal contact, we have 1h. 40m. for all, and the seconds run, Russell, 26.65; Lenehan, 29.25; Dr. Wright, 23.00; Morris, 16.00; Hargrave, 10.40; Bladen, 44.34; Brooks, 26.48. Mr. Bladen says he waited before recording this time until he was quite sure contact was made, and his observation is obviously late. Now the effect of bad atmospheric conditions

here would be different from what it was at ingress,—it tends to make the time sooner by bridging over the narrow streak of sunlight before the actual contact. If, therefore, we take a mean of the four observations not affected by these conditions, we find it is 26.35. I may mention in passing that the predicted times of egress agree better with the observations for this third contact; it was 1h. 40m. 28s., a little more than one second in error only.

For the external contact, we have Russell, 1h. 42m. 8.95s.; Lenehan, 4.25s.; Wright, 3.00s.; Morris, 16.00; Hargrave, 0.09s.; Bladen, 23.64s.; Brooks, 8.59s. Mr. Bladen seems to be again late, and in this case also waited till he was quite sure there was no trace of the planet, which, when the definition was bad, as it then was at Katoomba, would mean waiting for some seconds after the last of the planet was seen. The computed time for this phase is 1h. 42m. 11s.

Turning now to the phenomena. No special attention was called beforehand to the white spot or the aureola, and it is remarkable that only two saw the white spot. Mr. Hargrave says 3 minutes after ingress—"There is an optical illusion like a spot of light in the centre of Mercury, which disappears on looking steadily at it"; this was using the full aperture. An hour later he reduced the aperture to 2 inches, and saw "the white spot still dancing about the middle of Mercury." Mr. Brooks observing at Bathurst says, "Three minutes after internal contact, there appeared to be a whitish spot in S.P. quadrant, and an irregular white band of light inside the planet's disc (I suspect this was merely optical, as I did not see it near the egress, when however the light was not nearly so good)." It is noteworthy that Mr. Brooks and Mr. Hargrave both saw this three minutes after ingress. Mr. Brooks speaks also of "an irregular white band of light inside the planet's disc," and I saw probably the same thing, and thus refer to it:—"In moments of good definition Mercury appeared intensely blue-black, at other times streaks of light, cloud-like, and curved within the limb of Mercury, were seen on the planet for a few seconds at a time, something like the shading on a ball; whenever the definition improved, these at once disappeared, and the impression I had at the time was that I was looking at an optical illusion, caused by the vibration of the air which transposed rapidly on my retina the dark planet and bright sun. I did not at any time see a spot of light in the centre, and I looked most carefully for it, as well as for the aureola round the planet." Amongst astronomers, the general impression is that this is a subjective phenomenon, but it is time it was explained, so that we may know whether it is something pointing to the physical condition of Mercury, *or the observer*.

In the transit of 1878, most of the observers saw the aureola; but of the seven New South Wales observers of this transit only

two saw anything of it. Mr. Lenehan saw it for upwards of an hour. He says—"At 8h. 50m. an apparent halo round the planet; it was of a lighter colour than the sun, and about one-third the diameter of the planet wide. At 9h. 50m. the halo still visible, the disc of the planet being sharp with marginal indistinctness or halo." Light clouds came over the sun, and he did not again see the halo.

Mr. Conder says—"I watched the planet at intervals during the transit, the definition most of the time being magnificent. The sun spots and markings were very distinct, although thin fleecy clouds were spread over the whole of the sky. I failed to notice any peculiar appearance, except perhaps a very faint suspicion of a halo or yellowish light surrounding the intensely black disc of the planet, and slightly brighter than the general illumination of the sun's disc. This I attributed to an optical illusion rather than a real physical phenomenon."

Mr. Conder and Mr. Brooks, who evidently had the steadiest definition, saw nothing of the black drop phenomena. Mr. Hargrave observing with full aperture saw nothing of it, but Mr. Bladen, who was only 20 feet away from Mr. Hargrave, had reduced his telescope to 2 inches aperture, and saw "Mercury very indistinct and tremulous," and he says, "I thought from the irregular shape that internal contact would be complete, but for bad definition and unsteadiness," and it was not until 16 seconds later that he was sure a band of light separated the limbs.

In Sydney, the definition was so bad that contact seemed to me made and broken several times before it was actually so. At egress, when near internal contact, I was troubled with the same difficulty, but fortunately before the actual contact the air got steady, and enabled me to see the gradual approach of the limbs without the formation of a black drop or haziness.

Now before I offer any remarks upon these phenomena, I should like to call your attention to the fact that those observers who had a clear steady atmosphere (with one exception, and his case may be explained by the very small aperture used in observing) were not troubled with any drop phenomena, while those who had bad definition saw more of the drop than they wanted.

The generally received explanation of the black drop phenomena attributes it to irradiation, which gives the sun as seen in our eyes what might be called a false edge, or a visible one larger than the real one; the amount of this Mr. Stone estimated at $\frac{1}{30}$ the diameter of Venus. If this were the explanation of the black drop so frequently seen, it would follow as a necessity that these phenomena should be seen at all planet-transits.

Now, at the transit of Venus, it was my good fortune to have a splendid day and superb definition to observe the ingress and egress, and I saw none of the drop phenomena. Many other

observers failed to see it, though trained and furnished with good telescopes. This rather shook my faith in the irradiation theory. At the recent transit of Mercury, as I have just read to you, those who had good definition saw nothing of the drop; those who had bad definition saw more of it than they wanted to see, and I am convinced that one must not look to irradiation for an explanation. In the first place the amount of this depends upon the brilliance of the sun, and when the sun is looked at in the telescope, by reflection or coloured glasses all this brilliance is cut off, and there is wanting the condition for irradiation; for, be it remembered, it is not the *actual* brilliance of a body, but so much of it as is presented to our eyes, that causes irradiation, and from experiments I have made and hope to show you, at least in part, I am convinced that black drop phenomena mean simply bad definition or vibratory motion in the body looked at. We are all familiar with the persistence of vision which carries to our minds the image of something when there is nothing but the space through which something passed, of which passage our persistent vision gives us a misleading impression. If a black body be placed in front of a white one and made to vibrate rapidly, to our eyes it at once enlarges, the space round it becoming a grey halo, aureola or fringe. Now, if we have the limb of the sun bounded by the relatively black sky, and a black planetary disc on the sun and near the limb, that is, separated by just a thread of light, any vibratory motion in the atmosphere would at once cause the two dark objects to bridge over the white line, just as you see in this model,* vibration causes a dark ligament to join the two, and if the vibration is of large amplitude you see distinctly between the two limbs a triangular piece with curved sides, what was called by several transit of Venus observers a "Chinaman's cap." When contact with the sun's limb is made, such vibration rounds off the points of the cusps, and seems to make the planet cling to the limb, and in some cases make it like the letter D.

Now this vibratory motion in the atmosphere is about the commonest difficulty of the observer. It is seldom absent; and this is not to be wondered at when we consider that any mixing of currents of unequal temperature, or dry and moist currents, will at once cause such vibratory motion, which is simply unequal refraction of the rays of light passing through.

It is not therefore to be wondered at that ligaments, black drops, &c., are such common phenomena at planetary transits. What is wanted is, that we should be familiar with the phenomenon

* A steel wire held firmly in a vice carried at the free end a disc of paper, part of which was made black to represent the sky, while on the white part taken for a part of the sun's limb was a round black spot very near the edge of the white. When the wire is made to vibrate, the planet and sky seem to join and form a perfect black drop.

and able to estimate or measure the amplitude of the vibrations, so that we can tell how far they would affect the observations. I am not at present prepared to say what is the best thing for the observer to do under these circumstances, but I hope to return to it after further experiments.

TABULAR STATEMENT OF THE OBSERVED TIMES OF TRANSIT OF MERCURY.

	1st External Contact.	1st Internal Contact.	2nd Internal Contact.	2nd External Contact.
	h. m. s.	h. m. s.	h. m. s.	h. m. s.
Russell	8 21 44·64	8 23 39·14	1 40 26·65	1 42 8·95
Lenehan.................	22 8·00	43·00	29·25	4·25
Wright	21 20·00	10·00	23·00	3·00
Morris	22 15·00	46·00	16·00	16·00
Hargrave	22 0·66	41·38	10·40	0·09
Bladen	22 3·34	42·84	44·34	23·64
Conder	22 5·00	35·75	....	....
Brooks	22 3·60	36·45	26·48	8·59
Means	8 21 57·53	8 23 36·82*	1 40 25·16	1 42 9·217
Computed.........	8 21 14.	8 22 59	1 40 28	1 42 11

* Without Wright, 40·65.

REPORT ON TRANSIT OF MERCURY.

Observed at Sydney, November 8th, 1881, *by H. C. Russell, Government Astronomer.*

At Sydney the morning was very fine and seemed to promise good definition for the transit, but the first glance through the telescope revealed the fact that there was plenty of the moisture present that formed the clouds extending for some days on either side of the transit. We were fortunate however in seeing at all after the very unfavourable atmospheric conditions existing, and it is worth noting that towards the end of the time the cirrus clouds were increasing so fast that if the time had been half an hour later we should have lost the egress altogether. Similar conditions existed at Katoomba and Bathurst. At ingress I was unable to use the large refractor because the time-ball tower prevented me from seeing the sun at the time of ingress; I therefore used the 7¼-inch Merz refractor in the north dome, time was taken by having Poole mean-time chronometer so close to the eye-piece that I could hear the ticks and see the dial directly I turned from the telescope. I was ready to observe some minutes before the predicted time, and found the definition of the sun's limb very bad indeed, at 8h. 21m. 34·64s., thought I saw first contact, but had to wait ten seconds before I was sure; making

the time of external contact as observed by me with 7¼-inch refractor and power 150, 8h. 21m. 44·64s. The circumstances were very unfavourable, and I cannot attach much weight to this observation. At 8h. 23m. 5s. Mercury on the sun presented a D-like shape, definition being very bad; at times the planet seemed to vibrate nearly its whole diameter, yet the sky was clear. At 8h. 23m. 39·14s. I noted a very unsatisfactory internal contact, for the contact seemed made and broken several times over; each time the limb of the sun was thrown into violent agitation, and the time taken was when I was certain internal contact was made; as the definition continued very bad it may be late. The sun being now above the tower I used the 11½-inch refractor with 6-inch stop, and a polarizing eye-piece without coloured glass, magnifying powers from 100 to 200 were used, some having quartz lenses; but though the planet was very carefully watched for halo, satellite or physical phenomena, no sign of a ring of light round it or of a satellite could be seen, although in moments of best definition the black specks of the sun's mottling could be distinctly seen. During the forenoon from about 9 a.m. thin cirrus clouds were forming and steadily shutting out the sunlight; but the definition seemed rather to improve.

At times before this haze got thick, Mercury appeared intensely blue-black, at other times white streaks of light, cloudlike and curved within the limb of Mercury were seen on the planet for a few seconds at a time something like shading on a ball; whenever the definition improved these at once disappeared, and the impression I had at the time was, that I was looking at an optical illusion, caused by the vibration, which transposed rapidly on my retina the dark planet and bright sun. I did not see a central white spot at any time.

As Mercury got near to the point of egress at 1h. 39m. 55s. one of these bursts of bad definition occurred, a shade or dark band connected the sun's and planet's limbs, then broke, and this was repeated several times in as many seconds, and then ceased, leaving a clear band of light between the limbs, and a fairly steady definition which enabled me to see the gradual approach of the limbs without the formation of black drop or haziness, and last internal contact was satisfactorily observed at 1h. 40m. 26·65s.; ten seconds later the planet seemed to elongate towards the point of contact. I had no doubt that this was another burst of bad definition. At this time the clouds were thickening very fast, and I was obliged to turn the polarizing eye-piece to admit all the light it would in order to see the last contact, which I observed at 1h. 42m. 8·95s.; after that I could see nothing of the planet, nor was it likely that a phenomena so delicate as the planet on the bright light about the sun could be seen through so much haze.

My observations at egress are much better than ingress. I was

using the splendid Schroeder refractor with polarizing eye-piece, so that the sunlight could be exactly adjusted to comfort, and varied at pleasure to try the effect of more or less light; the air in spite of thin clouds was steadier, so that the conditions were favourable. At ingress it was not so; the definition was very bad, and I think made worse by the sun in the early morning before the building got warm setting up air currents in the dome.

Reported times by Dr. H. G. A. Wright. Telescope used, 8½. "With Browning" reflector. Position, 2,300 south and 792 east from Sydney Observatory:—

(5-inch aperture used.)

	h.	m.	s.
Ingress—			
External contact	8	21	20
Internal contact	8	23	10

(7½-inch aperture used.)

	h.	m.	s.
Egress—			
Internal contact	1	40	23
External contact	1	41	57
And certain notch 5s. later ...	1	42	3

On 8½-inch reflector power 80 stops, 5 inches for ingress and 7½ for egress. Browning double prism solar eye-piece, and Barlow lens.

Reported times by Mr. Morris, of the Survey Department. Telescope used 8½. "With Browning" reflector. Powers, 100 to 150. Place, Petersham, 5 miles S.S.W. from Sydney Observatory:—

	h.	m.	s.
External contact	8	22	15.00
1st internal contact	8	23	46.00
2nd internal conduct	1	40	16.00
External contact	1	43	16.00

Observations made at Katoomba, a place on the Western Railway, 66 miles from Sydney, and 3,400 feet above the sea. Longitude, 150° 14′ 53.47″ E. Latitude, 33° 42′ 27.27″ S.

Report made by H. A. Lenehan, First Assistant at Sydney Observatory.

Tuesday morning, the 8th November, was fine, with a clear sky, and every prospect of favourable conditions for observation; but towards midday light fleecy clouds covered the sun and surrounding sky, preventing the certainty of definition anticipated.

The ingress was observed through a 3-inch telescope, of 4 feet focal length, hurriedly placed on a stand in the quadrangle, steadied by hand, and observations taken as well as possible under the conditions. The first indent on the sun's limb was noticed at 8 h. 22m. 8·00 sec., and the planet moved steadily and clearly on

towards internal contact, which was observed at 8h. 23 m. 43·00s. The observations were now continued with the 7¼ Merz equatorial, stopped down to 6 inches, and a great unsteadiness was observable, attributed to the atmosphere. At 8h. 44m. the planet was about equi-distant with group of spots from limb of sun. At 8h. 49m. atmosphere unsteady, and continued unsteady. At 8h. 50m. an apparent halo round planet. At 9h. 6m. halo still visible. At 9h. 50m. disc of planet sharp, with marginal indistinctness or halo. This was a lighter colour than the sun, and about one-third the diameter of the planet wide. No appearance of any satellite. At 10h. 17m. definition improved, but light clouds over sun. At 10h. 39m. definition not good. At 10h. 50m clear disc, halo not discernible.

Towards egress the sky was covered with light clouds, rather thick over face of sun; and at 1h. 10m. definition bad, with marginal indistinctness. At 1h. 35m. definition improved.

The first contact at egress was at 1 h. 40m. 29·25s. There was, as stated above, no absolute certainty in the actual time, as the definition was not good and the wind high, causing vibration in telescope, but I am satisfied with the time given. External contact at egress occurred under same conditions, at 1h. 42m. 4·25s.

(1) *Report from Law. Hargrave, double star observer. Telescope, a 4¾ equatorially mounted refractor, with clock-work and first surface reflection solar eye-piece. Place, Katoomba. November* 8, 1881.

6h. 45m. a.m., and 2h. 9m. p.m., compared chronometers with Sydney Observatory; by telegraphed clock ticks weather all that could be wished. 8h. 22m. 0·66s. S.M.T., when I saw the first contact, definition very good. Mercury larger than I expected; full aperture 4¾ inches, and the low power 100, with the darkest glass. When the planet was ¾ on the sun the cusps were slightly rounded. This appearance did not last till the second contact, which was at 8h. 23m. 41·38s., S.M.T.; definition very good; quite calm. The cluster of spots and faculæ were very clear 3 minutes after ingress, there is an optical illusion like a spot of light in the centre of Mercury, which disappears on looking steadily at it. The limb of Mercury is a hard line; no colour or difference in the light on the sun at the planet's limb; cirrus clouds over the sun at 8h. 43m., S.M.T. At 9h. 20m., S.M.T., tried the high power; definition bad; it is shaky with the low one too; reduced the aperture to about 2 inches; much better definitions; still cirrusy. The white spot still dancing about the middle of Mercury. The blackness of Mercury is more intense than that of a sun-spot. 9h. 53m., S.M.T., a small whirlwind carried the leaves up about 59 feet close to the observatory.

10h. 40m., S.M.T., thin clouds passing; tried the full aperture again with two coloured glasses; exchanged for the darkest glass and 2-inch aperture, which is best. Large solar halo. 12h. 13m., S.M.T., took off the 2-inch stop; clouds getting thicker; the sun's limb well defined. At 12h. 25m., S.M.T., the white spot very persistent. 1h. 35m., S.M.T., hazy and light clouds passing. 1h. 40m. 10·40s., S.M.T, internal contact at egress, both limbs moderately well defined; cusps sharp. 1h. 42m. 0.09s., S.M.T., last contact.

LAW. HARGRAVE,
Extra Observer (Astronomical).

Report from F. M. Bladen. Place, Katoomba.

Weather.

The weather in early morning was very clear and warm. Strips of cirro-stratus cloud flying on horizon east and west.

Instrument.

The instrument was a refractor by T. Cooke, of York, England. mounted equatorially, with clock motion. Focal length, 5 feet; aperture, 4¼ inches (stopped down to 2 inches); eye-piece solar, diagonal, power about 80, light blue tinted glass shade.

Ingress.

Definition very good indeed; sun's limb being very clear and sharp, and sun spots and faculæ very distinct.

First contact.

First external contact took place at 8 hours 22 minutes 3·34 seconds, Sydney mean time, when slight indent was visible, which in a second or two had become too marked to be mistaken.

Definition of cusps.

The outline of the planet as it crept on the sun was very clear and well defined—cusps sharp and distinct.

Haze.

This continued until the planet was about ¾ of its diameter on the sun, when a light cirrus cloud passed over, rendering the cusps very indistinct and tremulous.

Estimated first internal contact.

At 8 hours 23 minutes 24·64 seconds, Sydney mean time, I thought from the irregular shape of Mercury that internal contact would be complete, and that it would be visible but for bad definition and unsteadiness.

First internal contact.

It was not, however, until 8 hours 23 minutes 42·84 seconds, Sydney mean time, that a band of light was visible between

planet and sun's limb, and this from its breadth and the planet's rate of motion, could doubtless have been seen with better definition, two or three seconds earlier, if not more.

Bisection.

No sign whatever could be detected during ingress of that portion of Mercury which was off the sun's disc, nor could any halo be seen at the cusps.

Mercury on the sun.

Mercury, when on the sun, appeared a perfect sphere, intensely black (more so than sun-spots), without any halo, haze or spots, the outline of planet being remarkably sharp. No companion visible.

The definition for about an hour after the ingress was very good indeed; but with the highest powers and different stops on objective nothing noteworthy could be detected.

Egress.—Weather.

Weather not so favourable; sky covered with light cirrus clouds. Mercury still a clear well-defined disc on face of sun, but the sun's limb unsteady and boiling.

Second internal contact.

Second internal contact 1 hour 40 minutes 44·34 seconds, Sydney mean time. I waited before taking this time until I was quite sure contact was complete; the boiling referred to above making it very difficult to decide.

Second external contact.

The planet did not pass steadily off the sun, but in a series of jumps of about half (½) a second in duration, which may have lasted from ten to fifteen seconds, when I was quite certain no trace of the planet was visible. I took the time, 1 hour 42 minutes 23·64 seconds.

Throughout egress the sun's limb was considerably more disturbed and uncertain than at ingress.

Report from W. J. Conder, Chief of the Trigonometrical Branch of Survey Office.

I have the honor to transmit the following report of observations made by me, during the transit of Mercury, on the 8th November, 1881, at the Racecourse, near Bathurst, New South Wales.

The telescope used is a 4¾-inch refractor, by Schröder; focal length, 5 feet 6 inches, equatorially mounted, and with clock motion; this, however, was so irregular that it often became necessary to drive the telescope by hand in the usual manner. A diagonal eye-piece with dark neutral shade, and power 96, was employed for the observation; and having tested the telescopic

appearance of the sun, with various sized stops on object-glass, I determined to use the whole aperture, definition being very good.

Having the advantage of an electric chronograph, so that the beats of the Sydney Observatory standard sidereal clock were recorded on a tape side by side with the ticks of my chronometer only a short time before and after the phenomenon, errors in the recorded times were practically eliminated.

In the early morning the weather was particularly fine; but, about the time of ingress, thin clouds commenced to spread over the sky, which, however, did not cause any difficulty in the observation of the ingress, definition being then very good; at its first appearance, the planet seemed to me more like a dark shadow entering on the sun's limb, like the umbra in an eclipse of the moon, rather than an opaque body forming a distinct notch.

As the telescope was not driven by the clock so regularly as to keep the sun's image stationary in the field, some small specks of dust on the eyeglass caused occasional apparent notches on the sun's limb, and for a second or two I was in doubt whether the indentation I saw at ingress was occasioned in this way, or by the planet. I waited until certain that it was really Mercury before closing the electric key, and the record thus made and reduced to Sydney mean time, is November 8th, a.m., $8^h\ 22^m\ 5{\cdot}00^s$.

Comparing mentally, after the event, the distance between the cusps at the time recorded, I estimated this at 6 to 7-tenths of the planet's diameter. As this estimate was not made at the time, it is of course not intended to be used in computation, though I feel considerable confidence in its approximate correctness.

A few seconds before the internal contact at ingress, the telescope was slightly touched accidentally, causing vibrations which had scarcely ceased when the limbs of the planet and sun appeared to be tangential. This was recorded at 8h. 23m. 35·75s. a.m. Sydney mean time. As I felt in some doubt whether the cusps had really closed at this instant, I continued to watch very carefully; and within so small an interval of time afterwards as to be scarcely appreciable, an extremely fine line of light was noticed separating the planet from the sun's limb, which gradually widened until it became evident that Mercury was wholly projected on the sun's disc.

I watched the planet at intervals during its transit, the definition most of the time being magnificent. The sun spots and markings were very distinct, although thin fleecy clouds were spread over the whole of the sky. I failed to notice any peculiar appearances, except perhaps a very faint suspicion of a halo or yellowish light surrounding the intensely black disc of the planet, and slightly brighter than the general illumination of the sun's disc. This I attributed to an optical illusion rather than a real physical phenomenon.

Up to within about two minutes of the internal contact at egress the observation of this phase could have been satisfactorily made, although the thin layer of cloud cut off a considerable part of the sunlight, but a patch of cloud of greater density intervened at the critical moment so as almost completely to hide the sun. My last view of Mercury was at 1h. 40m. 9·2s. p.m. Sydney mean time, very near to internal contact, but I am quite certain that it was then separated from the sun's limb by a narrow streak of sunlight. Immediately after this I lost sight of the sun's limb, and after waiting a short time, hoping that this dense cloud would pass over, as a last chance I removed the neutral shade, which was very dark, with the expectation of being able to distinguish the sun's limb through the cloud without the shade. My eye, however, was unable to adjust itself readily to the large increment of light; so that, to my great disappointment, I failed to observe either phase of the egress.

The position of our telescopes has been deduced from that of a fixed point in the trigonometrical survey, with which it has been connected by triangulation.

The observatory used by Mr. Brooks at the same time was 86½ links north and 30 links west from the one referred to in this report.

Positions of the stations near Bathurst, used for the transit of Mercury by Messrs. Conder and Brooks :—

	Latitude.	Longitude.
Mr. Conder's station	33-25-45·5	149-33-47·9*
Mr. Brook's station	33-25-44-9	149-33-47·7

Report from J. Brooks, F.R.G.S., Trigonometrical Surveyor.

I have the honor to forward herewith report on the transit of Mercury as observed by me at Bathurst on the 8th instant.

Telescope.

Telescope used was by Troughton and Simms, of 3¾-in. aperture, stopped down to 3-in.; eye-piece for ingress 110 with lighter of the two coloured shades; the sun's light being reflected by plane surface of plano-convex lens mounted diagonally.

Definition.

With a view to testing the definition I went to the telescope about an hour before ingress. Day was clear, except a few light fleecy clouds to west and north-west, with hardly any wind, just a light drift from south. A group of sun-spots, lying generally in direction of sun's centre, very happily marked about the locality

* The longitude of Sydney Observatory used for the Trigonometrical Survey is 10h. 4m. 50·81s.

of expected ingress. A little north of sun's equator were two clusters of sun-spots, the northern one seemingly consisting of 10 or 11 spots, the other of one large spot with two smaller companions. The large spot near the sun's centre very clear, the nucleus being divided (by a forked line) into three pieces. The whole of the sun's surface had a faint mottled appearance. Turning my attention to the cluster near point of ingress I noticed the faculæ at times very distinctly.

About three or four minutes before first external contact thin cirro-cumulus clouds covered the sky.

Ingress, first contact.

At 8h. 22m. 3·60s. I first caught sight of the planet, which quite decidedly notched the sun's limb before I was certain that it was the expected object. On reflection I think about $\frac{1}{10}$ of the planet's disc must have been on the sun's at the time. The disc remained circular throughout, except that at last contact at ingress it seemed to draw out slightly as if unwilling to leave sun's limb, leaving in my mind a faint suspicion of the "black drop."

Ingress, last contact.

At 8h. 23m. 36·45s. I caught first indication of a white line separating the sun and planet's discs.

Three minutes later there appeared to be a whitish spot on S.P. quadrant, and an irregular white band of light inside planet's disc (I suspect this was merely optical, as I did not see it near the egress, when however the light was not nearly so good).

At about 12 o'clock clouds were denser, causing planet disc to lose its dead black appearance and to assume a greyish black tinge. Definition remained fairly steady, and at 10 minutes before egress I changed eye-piece, using one marked 90, telescope and sunshade as before.

Egress, first contact.

At 1h. 40m. 26·48s. first internal contact at egress was made, without any indication whatever of black drop.

Egress, last contact.

At 1h. 42m. 8·59s. I saw the last contact. Owing to passing clouds dimming sun's disc, there may be an uncertainty of (say) one second in first, and about two in last contact at egress.

Chronometer.

Chronometer was compared indirectly with Sydney by chronograph, and I am indebted to Mr. F. F. Furber for efficient manner in which he noted the times of my signals.


A
B1
2
3
C

On the Inorganic Constituents of some Epiphytic Ferns.

By W. A. DIXON, F.I.C., F.C.S., Lecturer on Chemistry at the Technical College, School of Arts, Sydney.

[*Read before the Royal Society of N.S.W., 3 August, 1881.*]

As it appeared probable that some interesting information might be obtained from an examination of the ash of plants growing in such positions as to have earned for themselves the reputation of living upon air, and as the subject as far as I am aware has not before been taken up, I obtained some specimens of *Platycerium grande*, *P. alcicorne*, and *Asplenium nidus*, from the Clarence River, and also a specimen of the second from near Newcastle. With those from the Clarence there was a small piece of *Polypodium confluens*, which was too small to admit of more than an ash determination being made. It gave 5·35 per cent. of crude ash on the dried plant. Although these ferns could perhaps have been procured nearer at hand, it was thought preferable to get them from their native haunts in the brushes of the rivers, as anywhere in the neighbourhood of Sydney they would be sure to be contaminated with the dust with which the air is often plentifully laden. Along with each plant there was sent a piece of the wood and bark of the tree to which they were found clinging, so that a comparison of the ashes might be made.

To obtain the ashes the plants were first charred at a dull red heat in a large French clay crucible, the charcoal being pressed down by the addition of fresh portions of the plant as it diminished in volume. The charcoal was then burned off in a platinum basin over an argand gas lamp, and it was found that, by leaving the basin undisturbed and without stirring its contents, the whole of the carbon, except on the immediate surface, was consumed, leaving a very clean ash, even when the bottom of the dish did not appear red by daylight. The surface portion could then be skimmed off, as it were, and returned to the bottom of the basin with the next charge.

Contrary to what might be anticipated from the mode of their growth, it will be observed that the amount of ash in the growing fronds is quite as high as in the leaves of most plants, and those of *A. nidus* are rather rich in inorganic matter.

Platycerium grande.

This plant generally grows singly, and throws out at intervals of about six months large barren fronds or plates alternately to the right and left, which cling closely to the fronds which preceded them and to the tree to which it has attached itself at the bottom and sides; whilst the upper part spreads out into a crown, surmounted by antler-like processes, from which it derives its common name of stag's-horn fern. As the fern grows outward from the tree stem by the addition of plate upon plate, a basket-like space is left behind the crown, or perhaps it should be rather called coronet, to distinguish it from the growing crown of the plant; and this space forms a receptacle for rain, leaves and dust, whilst the dead plates form a humus-like mass interspersed with small rootlets, which often weighs several hundredweight. In this peaty matter an abundant fauna finds shelter, the specimen which was obtained for examination containing earthworms, centipedes, two species of ant, and several beetles. Some of these probably bring nutriment to the plant from without. The plant was divided into two portions for analysis—namely, live fronds, including both barren and fertile, and dead fronds and humus.

Analysis of live fronds.

Percentage of ash of the composition stated, 8·62.

Potash	33·88
Soda	11·33
Chloride of sodium...	1·77
Lime	21·99
Magnesia	5·58
Alumina	8·16
Ferric oxide	2·47
Manganese oxide (M_3O_4)	·45
Phosphoric oxide	9·18
Sulphuric oxide	1·47
Soluble silica	3·54
	99·82

Analysis of humus and roots.

Percentage of ash of composition given, 3·21—2·02.

Potash	7·05	11·25
Soda	2·26	3·61
Chloride of sodium	2·26	3·61
Lime	26·63	42·52
Magnesia	2·26	3·61
Alumina	12·88	20·55
Ferric oxide	1·83	2·90
Phosphoric oxide	1·16	1·85
Sulphuric oxide	6·33	10·10
Silica and silicates undecomposed by acid	37·31	......
	99·97	100·00

During burning, the humus emitted the characteristic odour of peat smoke. The second column gives the composition of the ash after deducting the silica, which was principally in the form of very fine white sand, which shows that some dust reaches even the still recesses of the scrubs.

Wood and bark of the tree to which P. grande was attached.

Percentage of ash of the composition given, 1·27.

Analysis of ash.

Potash	14·93
Chloride of potassium	8·09
Chloride of sodium...	traces
Lime	39·91
Magnesia	23·84
Ferric oxide	1·46
Manganese oxide	traces
Phosphoric oxide	7·94
Sulphuric oxide	traces
Soluble silica	3·89
	100·06

This ash differs notably from that of the fern in composition, especially in the almost complete absence of sodium and sulphuric oxide, and in the complete absence of alumina, which was found in all the specimens of *Platycerium* examined. Alumina has also been found as an undoubted ash constituent of various *Lycopodiums*[1], and it does not appear in the present instance to be an accidental constituent, as it was not found in the other plants, which all came in the same case and were treated exactly alike.

Platycerium alcicorne.

This fern grows in a similar manner to *P. grande*, except that numerous individuals grow together, forming a common humus mass, and although each plant is much smaller, the barren fronds or plates being only six or eight inches across, whilst in *P. grande* they are often two or three feet, the humus mass is generally much larger. They grow either on projecting rocks or attached to the stems of *Casuarinas* or other trees which do not shed their bark, and in the latter position they generally grow completely round the tree, their humus mass forming a bowl-like projection often two feet deep and four or five feet across the top, the rounded exterior being covered by the green and brown barren fronds.

[1] Aderholdt. Ann. d. Chem. u. Pharm., lxxxii, 111 (1852).
Church, Chem. News, xxx, 137. Salm-Horstmar, J. Pr. Chem. xl, 302, Solms-Laubach, Ann. Ch. Pharm., c. 297.

Analysis of live fronds.

Percentage of ash of composition given, 4·51.

Potash	20·51
Soda	17·90
Chloride of sodium...	12·07
Lime	13·73
Magnesia	14·57
Alumina	10·51
Ferric oxide	1·26
Manganese oxide (M_3O_4)	1·74
Phosphoric oxide	3·13
Sulphuric oxide	2·58
Soluble silica	1·73
	99·73

Analysis of dead fronds and humus.

Percentage of ash of the composition stated, 19·22—2·14.

Potash	traces	......
Alkaline chlorides	·71	6·00
Lime	2·86	24·17
Magnesia	·63	5·32
Alumina	2·60	21·98
Ferric oxide	2·33	19·69
Phosphoric oxide	·92	7·77
Sulphuric oxide	1·78	15·07
Sand and silica	88·38	......
	100·21	100·00

The last two analyses are from a plant which had grown attached to a rock, which accounts for the large percentage of sand in the humus mass. This sand consisted almost entirely of small angular fragments of white quartz. The following analyses were made on plants which grew on a *Casuarina* in a swamp, about three-quarters of a mile west of the Hunter River Copper-smelting Works at Newcastle. As the copper smoke from these works sometimes passes in this direction, the presence of oxide of copper in two of the ashes is thus accounted for, but that it does not do so often is shown by the *Casuarinas* and other trees being still alive and apparently healthy. The plants were separated into live fronds (including barren and fertile), withered barren fronds, and humus, as there was enough for this separation, which was not the case with the others.

Analysis of live fronds.

Percentage of ash of the composition stated, 4·74.

Potash	40·48
Soda	21·68
Chloride of sodium...	10·16
Lime	5·03
Magnesia	4·77
Alumina	7·28
Ferric oxide	·68
Phosphoric oxide	4·75
Sulphuric oxide	3·95
Soluble silica	·93
	99·71

Analysis of withered fronds.

Percentage of ash of composition given, 1·73—1·21.

Potash	1·76	2·95
Chloride of potassium ...	8·17	13·71
Chloride of sodium	3·36	5·64
Lime	17·01	28·54
Magnesia	4·21	7·07
Alumina	12·95	21·72
Ferric oxide	2·82	4·74
Oxide of copper	8·47	......
Phosphoric oxide	3·21	5·38
Sulphuric oxide	6·11	10·25
Sand	31·72	......
	99·79	100·00

In the second column both the sand and the oxide of copper have been removed as accidental ingredients, the analysis of the live fronds not showing a trace of the latter. The withered fronds were generally four or five plies thick, above or outside the humus and the sand and copper were doubtlessly lodged between these plies, which were not separated, and although the relative amount of copper is large, it will be noticed that from the small percentage of ash the actual amount is very small.

Analysis of humus mass.

Percentage of ash of composition stated, 2·64—1·91.

Potash	5·28	7·51
Chloride of sodium	6·77	9·64
Lime	27·97	39·89
Magnesia	5·82	8·29
Alumina	9·42	13·41
Ferric oxide	3·25	4·63
Oxide of copper	1·96	......
Phosphoric oxide	3·10	4·41
Sulphuric oxide	8·57	12·22
Sand	27·73	......
	99·87	100·00

From the locality occupied by these plants, and the actual occurrence of copper in their ashes, one would almost naturally conclude that they would contain a very considerable proportion of sulphuric oxide, but the analyses show that they actually contain less than those of the same species from the Clarence.

Casuarina wood and bark.

Percentage of ash of composition given, 2·03.

Analysis of Ash.

Potash	9·59
Soda	9·87
Chloride of sodium...	4·01
Lime	50·57
Magnesia	11·54
Ferric oxide...	1·34
Magnesia oxide (M_3O_4)	1·85
Phosphoric oxide	8·38
Sulphuric oxide	traces
Soluble silica	3·24
	100·39

The tree from which the ash analysis is given above was not the actual one upon which the ferns grew, but was of the same species (*C. padulosa*) from a different locality.

Asplenium nidus.

The fronds of this fern grow in a circle from the crown, the whole plant assuming a cup-like form, whence it derives its common name of bird-nest fern. This cup receives dead leaves and twigs, which are gradually wedged between the growing fronds and those which have arrived at maturity, and as the fronds die their bases and the leaves between them are cemented into a humus mass by rootlets.

The ash of the live fronds of the specimen examined retained the shape and markings of the fronds when allowed to burn gently and without disturbance.

Analysis of live fronds.

Percentage of ash of composition given, 12·35.

Potash	28·26
Chloride of potassium	23·10
Chloride of sodium...	13·26
Lime	18·56
Magnesia	6·72
Ferric oxide	0·87
Manganese oxide	traces
Phosphoric oxide	5·53
Sulphuric oxide	1·11
Soluble silica	2·15
	99·56

Analysis of humus mass.

Percentage of ash of composition given,	7·23	2·76
Potash	3·98	10·53
Chloride of potassium ...	1·69	4·48
Lime	18·32	48·47
Magnesia	3·37	8·92
Alumina	traces	traces
Ferric oxide	3·02	7·99
Phosphoric oxide	3·97	10·51
Sulphuric oxide	3·44	9·10
Sand	61·93	......
	99·72	100·00

Analysis of wood and bark of tree on which A. nidus grew.

Percentage of ash of composition given, 1·31.

Potash	22·12
Chloride of potassium	3·93
Chloride of sodium...	traces
Lime	38·07
Magnesia	3·93
Ferric oxide	1·51
Phosphoric oxide	9·57
Sulphuric oxide	3·75
Soluble silica	17·07
	99·95

It is evident from the peculiar habit of these plants that they must be dependent for their inorganic matter on what chance brings in their way; and it will be seen from the analyses that there is no similarity of ash composition between that of the living fern and that of the trees to which they cling. It further appears from the high percentage of sand in the ashes of the humus masses, as well as the oxide of copper in the specimens from Newcastle, that they must obtain much of their inorganic matter in the form of dust, as with the exception of the *P. alcicorne*, which grew on a rock and gave 88·38 per cent., they could not obtain it directly. The quantities in the others were—*P. grande*, 37·31, *P. alcicorne*, 27·73 and 31·72, *A. nidus*, 61·93.

They are all plants requiring considerable quantities of alkalies, and it will be observed that the growing parts take up as much as possible from the withered fronds and humus when these salts are deficient. The latter, being composed in part of rootlets, must necessarily retain some of the inorganic constituents. This is more clearly seen in the table at the end, where the principal inorganic constituents are calculated into parts in ten thousand of the dried

plants, which shows that *P. alcicorne* growing upon rock is very deficient in potash and soda, and has extracted almost the whole of these salts from the humus mass and dead fronds, and has made up for their deficiency by assimilating a large quantity of magnesia, lime, and alumina, which have been available in comparative abundance. The same species from Newcastle contains more than double the quantity of alkalies, which it has removed chiefly from the withered fronds, but still leaves in them and in the humus considerable quantities; whilst, although lime and magnesia are present in the humus in larger quantities than in the other, the living plant has not taken up so much. *P. grande* seems to have had an abundant supply of all its constituents, whilst *A. nidus* has been deficient only in sodium salts, which it has removed completely from the humus.

QUANTITIES of different constituents in 10,000 parts of the dried plants.

	P. grande.		*P. alcicorne.* From rock.		*P. alcicorne.* From tree.			*A. nidus.*	
	Live fronds.	Humus mass.	Live fronds.	Humus mass.	Live fronds.	Withered fronds.	Humus mass.	Live fronds.	Humus mass.
Potash	292·04	22·72	92·50	...	191·87	3·54	14·34	349·01	29·06
Soda	97·66	7·29	80·73	...	102·76	...	...	...	...
Chloride of potassium	...	...	...	12·84	...	16·62	...	285·28	4·48
,, ,, sodium	15·26	7·29	54·43		48·15	6·77	18·41	163·76	...
Lime	189·55	85·93	61·92	51·72	23·84	34·58	76·19	229·22	133·87
Magnesia	48·10	7·29	65·71	11·38	22·60	8·58	15·83	82·99	24·62
Alumina	70·34	41·51	47·39	47·13	34·50	26·31	25·60	...	...
Ferric oxide	21·29	5·86	5·68	42·13	3·22	5·69	8·84	10·74	21·35
Manganese oxide	3·87	...	7·85	...	...	...	...	...	...
Phosphoric ,,	79·13	4·07	14·12	16·62	21·81	6·46	8·42	46·29	29·01
Sulphuric ,,	12·67	20·40	11·63	32·24	18·72	12·45	23·34	13·70	25·12

Census of the Genera of Plants hitherto known as Indigenous to Australia.

By Baron Ferd. von Mueller, K.C.M.G., M.D., Ph.D., F.R.S.

[*Read before the Royal Society of N.S.W., 2 November, 1881.*]

"*Suum cuique.*"

The reasons for offering this generic list of Australian plants have been three-fold. In first instance it was to fill up a deficiency in the Flora Australiensis, that work giving no distinct record of the publications, in which the genera and indeed also the natural orders, represented in the native vegetation of this part of the globe, were first established. Secondly,—this list was to carry on the number of the genera beyond the Ferns to the Mosses, Lichens, Algs and Fungs; and furthermore it was to add all the genera of Di and Mono-cotyledoneæ, rendered known as Australian since the successive volumes of the Flora were issued. Thirdly,—it was wished to place by this index some of the orders of our native plants into a more natural sequence than that, by which the Monochlamydeæ are maintained as distinct; not to speak of some minor changes, which additional or extended observations in later years have rendered imperative. In furnishing chronologic data it was deemed but just, to trace back the authorship to the real literary originators of any ordinal or generic group of plants, though the earliest indications in this respect may have been vague or imperfect or even partly erroneous. But let us regard him as the literary constructor of an order or of a genus, who comprised within such systematic precincts a fair share of forms correctly grouped, notwithstanding that in the course of subsequent eliminations or alterations (which, with the access of new species or the better insight into known forms, goes on even at the present day), the original formula of the order or genus may have become much changed. In assigning generic limits I have been conservative, because practical experience in systematising through four decennia has led me to perceive, how much easier the memory is aided by allotting to generic complexes an ample space, than by ennarrowing them into more and more limited precincts. Nature created species only, not genera; the latter serve for more or less artificial aggregations of the former; on the real boundary of species, accepted in a limitation equivalent to that of

homo sapiens—of man himself—ought, when all organic forms shall have become well known, finally to be no dispute; whereas the circumscriptions of genera will ever to a large extent depend optionally on individual ideas of any particular systematists. These views I have expressed publicly more than twenty years ago, and subsequent research has not led me to change them.

In tracing the priority of each genus, I have checked the notations as far as from 1700 to 1862 by the great nomenclator of Pfeiffer, a work of most extensive records, resulting from almost unexampled patience, displayed in excerpting from thousands of volumes of literary treasures in great centres of modern learning. Bentham and Hooker's grand "Genera Plantarum," aided largely in quoting from the literature of the last twenty years. For all Dicotyledoneae, Jackson's Guide to the Literature of Botany, which carries to the present year, has also been consulted. Richter's Codex was a safe guide through all the writings of Linné. The small but important volume of Fraas proved the surest clue to many of the plants of the most ancient authors.

In dealing with the synonymy of the genera, it was not deemed necessary to do more than to give the bare name of those suppressed on this occasion, as otherwise the present index would have expanded much beyond the limits assigned to it. For this reason also I have with rare exceptions quoted of abolished genera only such as found their way actually into the literature of Australian plants. The few unexplained repetitions, occurring in the plain synonymy, cannot impair the use of this census for easy and practical reference. If, on account of a mere difference in adjective ending of the name of an order, or if in adopting etymologic or other simple corrections in the wording of genera, I have seen not sufficient reason to change the original authorship of either, then I have, at all events, avoided far-stretching pedantry.

It is not likely that very many genera will be added hereafter to the number of those recorded now as Australian, unless from the classes of the lower cryptogams, and especially from the realms of microscopic organism.

This census embraces 2,122 adopted genera, which number, in applying views less conservative, might have been doubled readily enough. No less than 300 authors from the time of the ancient Greeks and Romans to our own era stand sponsors to genera of plants, represented in our part of the globe; thus the toilsome exertions for creating the science of the vegetable world at the dawn of natural history are brought in close contact with the extended efforts of past-medieval ages, as well as with the mighty strides of the last century, which culminated, so far as systematising records are concerned, in the finishing sway of the present secular epoch.

DICOTYLEDONEAE.

Ray, Method. Plant. emend. 2 (1703).

CHORIPETALEAE HYPOGYNAE.

F. v. Mueller, native plants of Victoria I, 1 (1879).

RANUNCULACEAE.

A. L. de Jussieu, Rec. de l'Acad. des sc. (1773) from B. de Jussieu (1759).

Clematis, Linné, Gen. pl. 163 (1737), from l'Ecluse (1576).
Anemone, Tournefort, Inst. rei herb. 275, t. 147 (1700) from Hippocrates, Theophrastos and Dioscorides.
Myosurus, Dillenius, Nov. pl. gen. 106, t. 4 (1719) from Tabernaemontanus (1588). (Myosuros.)
Ranunculus, Tournefort, Inst. 285, t. 149 (1700) from Bock (1552).
Caltha, Ruppius, Fl. jen., 119 (1718), from Bock (1552).
(Trollius.)

NYMPHAEACEAE.

Salisbury, in Koenig & Sims' Ann. of Bot., II, 70 (1805).

Cabomba, Aublet, Guian. I, 321, t. 124 (1775).
(Brasenia, Hydropeltis.)
Nymphaea, Tournefort, Inst. 260, t. 137–8 (1700) from Theophrastos and Dioscorides.
Nelumbo, Tournefort, Inst. 261 (1700). (Nelumbium.)

DILLENIACEAE.

Salisbury, Parad. Lond. I, 73 (1806).

Wormia, Rottboell, Nye Saml. Vid. Selsk. Skrivt. II, 532 (1783).
Hibbertia, Andrews, Bot. Repos. t. 126 (1800).
(Candollea, Pleurandra, Hemistemma, Adrastaea, Ochrolasia, Hemistephus, Huttia.)
Tetracera, Linné, Gen. 345 (1737).
Dillenia, Linné, Gen. 162 (1737).
Pachynema, R. Brown in de Cand. Syst. I, 411 (1818).

MAGNOLIACEAE.

Jaume St. Hilaire, Expos. fam. II, 74, t. 83 et 84 (1805).

Drimys, R. et G. Forster, Char. gen. 83, t. 42 (1776).
(Tasmania.)

ANONACEAE.

A. L. de Jussieu, Gen. plant. 283 (1789) from B. de Jussieu (1759).

Uvaria, Linné, Amoen. acad. 404 (1747).
Fitzalania, F. v. Mueller, Fragm. phytogr. Austr., IV, 33 (1863).
Cananga, Rumphius, herb. Amboin., II, 193, t. 65 (1741).
(Fitzgeraldia.)
Ancana, F. v. Mueller, Fragm. phytogr. Austr., V, 27 (1865).

Polyalthia, Blume, Fl. Jav. Anon., 68 (1829).
Popowia, Endlicher, Gen., 831 (1839).
Melodorum, Loureiro, Fl. Cochinch. I, 351 (1790).
Miliusia, Leschenault in Mémoir. Genev. V, 213 (1832).
Saccopetalum, Bennett in Horsf. Pl. Jarvar. 165, t. 35 (1838).
Eupomatia, R. Brown in Flind. voy. II, App., 597 (1814).

Monimieae.

A. L. de Jussieu in Ann. du Mus. XIV, 30 (1809).

Doryphora, Endlicher, Gen. 315 (1837).
(Learosa.)
Atherosperma, Labillardière, Nov. Holl. pl. specim. II, 74 t. 224 (1806).
Daphnandra, Bentham, Fl. Austr. V, 285 (1870).
Mollinedia, Ruiz et Pavon, fl. Peruv. et Chil. Prodr. 83, t 15 (1794). (Kibara, Wilkiea).
Hedycarya, R. et G. Forster, Char. gen., 127, t. 64 (1776).
Palmeria, F. v. Mueller, Fragm. phytogr. Austr. IV, 151 (1864).
Piptocalyx, Oliver in Benth. Fl. Austr. V., 292 (1870).

Myristiceae.

R. Brown, Prodr. fl. Nov. Holl. I., 399 (1810).

Myristica, Linné, Gen. ed II, 524 (1742).

Lauraceae.

Ventenat, Tabl. II., 245 (1799).

Cryptocarya, R. Brown, Prodr. I., 402 (1810). (Caryodaphne.)
Beilschmiedia, Nees in Wall. pl. Asiat. rar. II, 69 (1831). (Nesodaphne.)
Endiandra, R. Brown, Prodr. I, 402 (1810).
Cinnamomum, Burman, Fl. Zeil. 62 (1737).
Litsea, Lamarck, Diction. III, 574 (1789). (Tetranthera, Cylicodaphne, Litsaea.)
Cassytha, Osbeck in Linné, Spec. pl. I, 35 (1753).
Hernandia, Plumier, nov. pl. Amer. Gen. 6, t. 40 (1703).

Menispermeae.

A. L. de Jussieu, Gen. pl. 284 (1789).

Tinospora, Miers in Ann. and Mag. of nat. hist., second ser. VII, 35 (1851).
Fawcettia, F. v. Mueller, Frag. X, 93 (1877).
Cocculus, De Candolle, syst. I, 515 (1818) from C. Bauhin (1623). (Pericampylus partly, Legnephora.)
Tristichocalyx, F. v. Mueller, Fragm. IV, 27 (1863).
Hypserpa, Miers in Ann. and Mag. of nat. hist., 2nd ser. VII, 36 (1851). (Selwynia.)

Sarcopetalum, F. v. Mueller, Pl. of Vict. I, 26 Suppl. pl. III (1860).
Leichhardtia, F. v. Mueller, Fragm. phyt. Austr. X, 67 (1876).
Stephania, Loureiro, Fl. Cochinch. II, 608 (1790).
Pleogyne, Miers in Ann. and Mag. of nat. hist. 2nd ser. VII, 37 (1851). (Microclisia.)
Carronia, F. v. Mueller, Fragm. phyt. Austr. IX, 84 (1875).
Adeliopis, Bentham et J. Hooker, Gen. pl. I, 436 (1862).

PAPAVERACEAE.

A. L. de Jussieu, Gen. pl. 235 (1789) from B. de Jussieu (1759).

Papaver, Tournefort, Inst. 237, t. 119 (1700). (Perhaps immigrated.)

CAPPARIDEAE.

Ventenat, Tabl. III, 118 (1799).

Cleome, Linné, syst. nat. 9 (1735); Linné, Gen. pl. 200 (1737). (Polanisia.)
Gymnandropsis, De Candolle Prodr. I, 237 (1824). (Perhaps immigrated.)
Roeperia, F. v. Mueller, in Hooker's Kew Misc. IX, 15 (1857). (Tetratelia.)
Emblingia, F. v. Mueller, Fragm. phytogr. Austr. II, 2 (1860).
Cadaba, Forskael, Fl. Aeg. Arab. 67 (1775).
Capparis, Tournefort, Inst., 261, t. 139 (1700). (Busbeckea, Busbequea) from Theophrastos, Dioscorides and Plinius.
Apophyllum, F. v. Mueller in Hooker's Kew Misc. IX, 307 (1857).

CRUCIFERAE.

A. L. de Jussieu, Gen. 237 (1789) from B. de Jussieu (1759).

Nasturtium, R. Brown in Aiton. hort. Kewen. IV, 110 (1812), from Linné, syst. nat. 9 (1735).
Barbaraea, Beckmann, Lex. bot. 33 (1801). (Barbarea.)
Arabis, Linné, Gen. pl. 198 (1737). (Turritis) from Dalechamps (1554).
Cardamine, Tournefort, Inst. 224, t. 109 (1700) from l'Ecluse (1576).
Alyssum Tournefort, instit. 217 (1700) from l'Ecluse (1576). (Meniocus Alysson.)
Draba, Dillenius, Nov. gen. 122 (1719). (Perhaps immigrated.)
Sisymbrium, Tournefort, Inst. 225, t. 109 (1700).
Wilkia, Scopoli, Intr. ad hist. nat. 317 (1777). (Malcolmia.)
Erysimum, Linné, Gen. pl. 198 (1737). (Blennodia) from Tabernaemontanus (1590).
Stenopetalum, R. Brown in De Cand. Mém. du Mus. VII., 239 (1821).

Geococcus, Drummond and Harvey in Hook. Kew Misc. VII, 52 (1855).
Menkea, Lehmann, Ind. sem. hort. Hamb. 8 (1843).
Capsella, Medicus, Pflanzengatt. I, 85 (1792). (Hutchinsia partly, Thlaspi partly, Microlepidium.)
Senebiera, De Candolle, Mém. soc. d' hist. nat. Par. I, 140 (1799).
Lepidium, Tournefort, Inst. 215, t. 103 (1700). (Iberis partly, Lepia, Monoploca) from Dioscorides and Plinius.
Cakile, Tournefort, Coroll. 49 t. 483 (1703).

Violaceae.

De Candolle, Fl. Française, IV, 801 (1805).

Viola, Tournefort, Inst. 419, t. 236 (1700) from Plinius.
Hybanthus, Jacquin, Stirp. Amer. hist. 77, t. 75 (1763). (Ionidium, Pigea, Vlamingia.)
Hymenanthera, R. Brown in Tuck. Cong. 442 (1818).

Flacourtieae.

Richard, in Mém. du Mus. I, 366 (1815).

Cochlospermum, Kunth, Diss. Malv. 6 (1822).
Scolopia, Schreber, Gen. I, 335 (1789). (Phoberos.)
Xylosma, G. Forster, florul. ins. Austr. Prodr. 380 (1786).
Streptothamnus, F. v. Mueller, Fragm. III, 28 (1862).

Samydaceae.

J. Gaertner, de Fruct. III, 238 (1805).

Casearia, N. J. Jacquin, select. stirp. Amer. hist. 132, t. 85 (1763).
Homalium, N. J. Jacquin, sel. stirp. Amer. hist. 170, t. 183 (1763). (Blackwellia.)

Pittosporeae.

R. Brown in Flind. voy. II, App. 542 (1814).

Pittosporum, Banks in Gaertner de Fruct. I, 286 (1788).
Hymenosporum, R. Brown in F. v. Mueller, Fragm. II, 77 (1860).
Bursaria, Cavanilles, Icon. IV, 30, t. 350 (1797).
Marianthus, Huegel Enum. pl. austro-occ. 8 (1837).
(Oncosporum, Rhytidosporum, Calopetalum).
Citriobatus, Cunningham in Loudon, Hort. Brit. Suppl. I, 585 (1832). (Ixiosporum.)
Billardiera, Smith, Specim. of Bot. of New Holl. I, 1 (1793).
(Pronaya.)
Sollya, Lindley, Bot. Regist. XVII, t. 1460 (1831).
Cheiranthera, Cunningham in Brogn. Bot. du voy. de la Coquille, t. 77 (1829).

Droseraceae.

Salisbury, Parad. Lond., 95 (1809).

Aldrovanda, Monti Act. Bonon, II 3, 404 (1747).
Drosera, Linne, Gen. pl. 89 (1737). (Sondera.)
Byblis, Salisbury, Paradis. Lond. t. 95 (1808).

Elatineae.

Cambessedes in Mèm. du Mus. XVIII, 225 (1829).

Elatine, Linné, Gen. pl. 118 (1737).
Bergia, Linné, Mant. II, 152 (1771).

Hypericeae.

Jaume St. Hilaire, Expos. fam. II, 23, t. 75 (1805).

Hypericum, Tournefort, Inst. 254, t. 131 (1700), from Dioscorides and Plinius.

Guttiferae.

A. L. de Jussieu Gen. 243 (1789).

Calophyllum, Linné, gen. 154 (1737).

Polygaleae.

A. L. de Jussieu in Ann. du Mus. XIV, 386 (1809).

Salomonia, Loureiro, Fl. Cochinch. I, 14 (1790).
Polygala, Tournefort, Inst. 174, t. 79 (1700) from Dioscorides and Plinius.
Comesperma, Labillardière, Nov. Holl. pl. sp. II, 21 (1806).
Xanthophyllum, Roxburgh, Pl. Corom. III, 81, t. 284 (1819).

Tremandreae.

R. Brown in Flind. voy. II. App. 544 (1814).

Platytheca, Steetz in Lehm. pl. Preiss. I, 220 (1845).
Tetratheca, Smith, Specim. of the Bot. of N. Holl. I, t. 2 (1793).
Tremandra, R. Brown in Flind. voy. II, App. 544 (1814).

Meliaceae.

Ventenat, Tabl. III, 159 (1799).

Hedraianthera, F. v. Mueller, Fragm. V, 58 (1865).
Turraea, Linné, Mantiss. II, 150 (1771).
Melia, Linné, Gen. pl. 127 (1737).
Dysoxylum, Blume, Bijdrag. 172 (1825).
(Dysoxylon, Epicharis, Hartigshea.)
Amoora, Roxburgh, pl. Corom. III, 54, t. 258 (1819).
Synoum, A. de Jussieu in Mém. Mus. XIX, 226, t. 15 (1830).

Owenia, F. v. Mueller in Hook. Kew misc. IX, 303 (1857).
Aglaia, Loureiro, Fl. Cochinch. I. 173 (1790), non Allemand (1770). (Milnea, Nemedra).
Hearnia, F. v. Mueller, Fragm. V, 55 (1865).
(Aglaiopsis)
Carapa, Aublet, Hist. des pl. de la Guian. II. Suppl. 32 t. 387 (1775). (Xylocarpus.)
Cedrela, P. Browne, Nat. hist. of Jamaica, 158 (1756).
Flindersia, R. Brown in Flind. voy. II. App., 595 (1814). (Oxleya, Strzeleckia.)

Ochnaceae.

De Candolle in Ann. du Mus. XVII, 398 (1811).

Brackenridgea, Asa Gray, Bot. Wilk. Unit. Stat. Expl. exp. 361, t. 42 (1854).

Rutaceae.

A. L. de Jussieu, Gen. 296 (1789).

Zieria, Smith in Transact. Linn. Soc. IV, 216 (1798).
Boronia, Smith, Tracts. relat. to Nat. Hist. 285 (1798).
Eriostemon, Smith in Transact. Linn. Soc. IV, 221 (1798).
(Crowea, Phebalium, Asterolasia, Microcybe, Geleznowia, Urocarpus, Sandfordia, Actinostigma.)
Philotheca, Rudge in Transact. Linn. Soc. XI. 298, t. 21 (1815).
(Drummondita).
Correa, Smith in Transact. Linn. Soc. IV. 219 (1798).
(Didymeria).
Nematolepis, Turczaninow in Bull. de la Soc. imp. des Nat. de Mosc. 158 (1852). (Symphyopetalum.)
Chorilaena, Endlicher in Huegel. enum. pl. Austr. occ. 17 (1837).
Diplolaena, R. Brown in Flinder's voy. II, 546 (1814)
Bosistoa, F. v. Mueller in Bentham's Fl. Austr I, 359 (1863).
Acradenia, Kippist in transact. Linn. Soc., XXI, 207, t. XXII. (1855).
Euodia, R. & G. Forster, Char. Gen., 13, t. 7 (1776).
(Melicope, Medicosma.)
Brombya, F. v. Mueller, Fragm. V, 4 (1865).
Pagetia, F. v. Mueller, Fragm. V, 178 (1866).
Bouchardatia, Baillon in Andans. VII, 350 (1867).
Xanthoxylum, Catisby in Linné hort. Cliffort, 487 (1737).
(Zanthoxylum, Blackbournia.)
Geijera, Schott, Rutac. 4, t. 7 (1834). (Coatesia.)
Pleiococca, F. v. Mueller, Fragm. IX, 117 (1875).

Acronychia, R. & G. Forster, Char. gen. 53 (1776).
(Cyminosma.)
Halfordia, F. v. Mueller, Fragm. V, 43 (1865).
Glycosmis, Correa in Ann. du. Mus. VI, 384 (1805).
Micromelum, Blume, Bijdr., 137 (1825).
Murraya, Koenig in Linné mantissa altera, 563 (1771).
(Chalcas, 1767.)
Clausena, Burman, Fl. Indic. t., 29 et index (1768).
Atalantia, Correa in Ann. du. Mus. VI, 383 (1805).
Citrus, Linné, Gen. 230 (1737) from Plinius.
Pentaceras, J. Hooker in B. & J. H. Gen. I, 298 (1862).

Simarubeae.

De Candolle in Ann. du Mus. VII, 323 (1811).

Ailantus, Desfontaines in Act. Acad. Paris, 265 (1786).
(Ailanthus.)
Brucea, J. S. Miller, Fasc. t., 25 (1780).
Hyptiandra, J. Hooker in B. & J. H. Gen. I, 294 (1862).
Cadellia, F. v. Mueller, Fragm. II, 25 (1860).
Suriana, Plumier, Gen. 37, t. 40 (1703).
Harrisonia, R. Brown in Mém. du Mus. XII, 517 (1825).
(Ebelingia.)

Zygophylleae.

R. Brown in Flind. voy. II, App. 3, 545 (1814).

Nitraria, Linné, Syst. ed. X, 1044 (1759).
Zygophyllum, Linné, syst. nat. 8 (1735); Linné, Gen. 126 (1737).
Tribulus, de l'Obel, Icon. II, 84 (1581). (Tribulopsis.) From Theophrastos, Dioscorides and Plinius.

Lineae.

De Candolle, Théor. élém., 214 (1813).

Hugonia, Linnè, Gen. 134 (1737).
Erythroxylum, P. Browne hist. Jamaic. 278 (1756).
(Erythroxylon.)
Linum, Tournefort, Inst. 339, t. 176 (1700) from Theophrastos, Dioscorides and Plinius.

Geraniaceae.

A. L. de Jussieu, Gen. 268 (1789) from B. de Jussieu (1759).

Geranium, Tournefort, Inst. 266, t. 142 (1700) from Dioscorides and Plinius.
Erodium, L'Héritier, Geraniol. t. 1–6 (1787).
Pelargonium, L'Héritier, Geraniol. t. 7 (1787).
Oxalis, Linné, Gen. 134 (1737) from Plinius.

Malvaceae.

Adanson in Mém. Ac. Par. p. 224 (1761), from B. de Jussieu (1759).

Lavatera, Tournefort in Act. Ac. Par. 80, t. 3 (1706).
Malvastrum, Asa Gray in Mém. Am. Ac. IV, 21 (1849).
(Malva partly.)
Plagianthus, R. & G. Forster, Char. Gen. 85, t. 43 (1776).
(Asterotrichon, Blepharanthemum, Lawrencia, Halothamnus).
Sida, Linné, Gen. 205 (1737) from Theophrastos.
Abutilon, Tournefort, Inst. 99, t. 25 (1700) from Camerarius (1586).
Urena, Dillenius, Hort. Eltham. 430, t. 319 (1732).
Pavonia, Cavanilles, Diss. II. App. II. (1786).
(Greevesia.)
Howittia, F. v. Mueller in Trans. Vict. Inst. I, 116 (1855).
Hibiscus, Linné, syst. nat. 9 (1735); Linné, Gen. 207 (1737).
(Fugosia partly, Abelmoschus, Paritium.)
Lagunaria, G. Don, Gen. syst. I, 485 (1831).
Thespesia, Solander in Ann. du Mus. IX, 290 (1807).
Gossypium, Linné, Gen. 206 (1737) from J. Camerarius (1586).
(Fugosia partly, Sturtia.)
Camptostemon, Masters in J. Hook, Icon. XII, t. 18 (1876).
Bombax, Linné, Spec. I, 511 (1753).

Sterculiaceae.

Ventenat, jard. de la Malmais. II, 91 (1804).

Sterculia, Linné, Fl. Zeyl. 166 (1747).
Brachychiton, Schott and Endlicher, Melet. bot. 34 (1832).
(Trichosiphon, Poecilodermis, Delabechea.)
Tarrietia, Blume, Bijdr. 5, 227 (1825).
(Argyrodendron.)
Heritiera, Dryander in Ait. Hort. Kew, III, 546 (1789).
Ungeria, Schott et Endlicher, Melet. 27–31 (1832).
Helicteres, Plukenet, phytogr. 181 t. 245 (1692).
Methorium, Schott et Endlicher, Melet. 29–30 (1832).
Melhania, Forskael, Fl. Aeg. Arab. 64 (1775).
Melochia, Dillenius, Hort. Eltham. 221 (1732).
(Riedleya).
Hermannia, Tournefort, inst. 656, t. 432 (1700).
(Gilesia, Mahernia partly).
Dicarpidium, F. v. Mueller in Hook. Kew Misc. IX, 302 (1857).
Waltheria, Linné Gen. 203 (1737).
Abroma, Jacquin, Hort. Vindob. III., t. 1 (1776).
Commerçonia, R. et G. Forster, Char. gen. 43 (1776).
(Commersonia, Ruelingia, Achilleopsis.)
Hannafordia, F. v. Mueller, Fragm. II. 9 (1860).

Seringia, Sprengel, Anleit. II, 694 (1818).
(Keraudrenia.)
Thomasia, J. Gay, Dissert 20 (1821).
(Leucothamnus, Rhynchostemon.)
Guichenotia, J. Gay in Mém. du Mus. VII, 448 (1821).
(Sarotes.)
Lasiopetalum, Smith in transact. Linn. Soc. 216 (1798).
(Corethrostylis, Asterochiton.)
Lysiosepalum, F. v. Mueller, Fragm. I, 143 (1859).

TILIACEAE.

A. L. de Jussieu, Gen., 289 (1789).

Berrya, Roxburgh, Pl. Corom, III, 60, t. 264 (1819).
Grewia, Linné, syst. nat. 9 (1735); Linné, Gen. 276 (1737).
Triumfetta, Plumier, Nov. gen. 40, t. 8 (1703).
Nettoa, Baillon in Adansonia VI, 238 pl. VII (1866).
Corchorus, Tournefort, Inst. 259, t. 135 (1700).
Sloanea, Linné, Hort. Cliff. 210 (1737).
(Echinocarpus.)
Aristotelia, L' Héritier, Stirp. II, 21, t. 16 (1784).
(Friesia.)
Elæocarpus, J. Burman, thesaur. Zeylan. 39, t. 40 (1737).
(Elaiocarpos.)

EUPHORBIACEAE.

A. L. de Jussieu, Gen. 384 (1789) from B. de Jussieu (1759).

Calycopeplus, Planchon, in Bull. de la Soc. Bot. VIII, 31 (1861).
Euphorbia, Linné, Gen. 152 (1737) from Plinius.
Monotaxis, Brogniart in Duperr. voy. Bot. 223, t. 49 (1829).
(Hippocrepandra.)
Poranthera, Rudge in Transact. Linn. Soc. X, 302, t. 22 (1811).
Micrantheum, Desfontaines in Mém. du Mus. IV, 253 (1818).
(Caletia.)
Pseudanthus, Sieber in Sprengel, Syst. Cur. post. 25 (1827).
(Stachystemon.)
Beyeria, Miquel in Ann. des scienc. nat., trois. sér. I, 350 (1844).
(Calyptrostigma, Beyeriopsis.)
Ricinocarpus, Desfontaines in Mém. du Mus. III, 459 (1817).
(Roeperia.)
Bertya, Planchon in Hooker's Lond. Jour. of Bot. IV, 472 (1845).
Amperea, Adr. de Jussieu, Euphorb. 35, t. 10 (1824).
Antidesma, Linné, Fl. Zeyl. 169 (1747).
Andrachne, Linné, syst. nat. 9 (1735); Linné, Gen. 287 (1737).
Actephila, Blume, Bijdr. 581 (1825).
Dissiliaria, F. v. Mueller in Baill. Adans. VII, 356 (1867).
Petalostigma, F. v. Mueller in Hooker's Kew Misc. IX, 17 (1857).
(Hylococcus.)

Phyllanthus, Linné, Gen. 282 (1737) from J. Commelyn (1697).
(Synostemon, Glochidion, Bradleia.)
Breynia, R. et G. Forster, Char. gen. 145, t. 73 (1776).
(Melanthesa, Melanthesiopsis.)
Securinega, A. L. de Jussieu, Gen. 388 (1789).
(Flueggea.)
Neoroepera, F. et J. Mueller, in De Cand. Prodr. XV, 489 (1866).
Bischoffia, Blume, Bijdr. 1168 (1825.)
Hemicyclia, Wight and Arnott, in Edinburgh phil, journ. XIV, 297 (1833).
Bridelia, Willdenow, Spec. IV, 978 (1805).
Cleistanthus, J. Hooker, Icones pl. t. 779 (1847).
Croton, Linné, Gen. 288 (1737).
Aleurites, R. et Forster, Char. gen. 111, t. 56 (1776).
Claoxylon, Royen in Adr. de Jussieu, Euphorb. 43, t. 14 (1824).
Acalypha, Linné, Hort. Cliff. IX, 495 (1737).
Adriana, Gaudichaud in Ann. des. sc. nat. V., 223 (1825).
(Trachycaryon.)
Alchornea, Solander in Swartz, Prodr. 6.98 (1788).
(Coelebogyne.)
Tragia, Plumier, Gen. 14, t. 12 (1703).
Mallotus, Loureiro, Fl. Cochinch. II, 635 (1790).
(Echinus, Rottlera.)
Macaranga, Petit Thouars, Gen. Madag. n. 88 (1809).
(Mappa.)
Codiaeum, Rumphius, herb. Amboin. IV, 65, t. 25 (1743).
Baloghia, Endlicher, Prodr. fl. Norf. 84 (1838).
Omalanthus, Adr. de Jussieu, Euphorb. 50 t. 16 f. 33 (1824). (Carumbium, Wartmannia.)
Sebastiania, Sprengel, Neue Entd. II, 118 (1821).
(Microstachys, Elachocroton.)
Excaecaria, Linné, Syst. ed X., 1288 (1759).

URTICACEAE.

Ventenat, Tabl. III, 524 (1799).

Celtis, Tournefort, Inst. 612, t. 383 (1700); from Camerarius (1586). (Solenostigma.)
Ulmus, Tournefort, Inst. 601, t. 372 (1700); from Dodoens (1583).
Trema, Loureiro, Fl. Cochinch. II, 562 (1790). (Sponia.)
Aphananthe, Planchon in Ann. des. sc. nat. trois. sér. X., 265 (1848).
Ficus, Tournefort, Inst. 662 (1700) from Plinius.
(Urostigma, Covellia.)
Cudrania, Trécul in Ann. des. sc. nat. trois. sér. VIII, 122 (1847).
Antiaris, Leschenault in Ann. du Mus. XVI, 476 (1810).
Fatoua, Gaudichaud in Freyc. voy. Bot. 509 (1826).

Elatostemma, R. et G. Forster, Char. gen. 105, t. 53 (1776).
Procris, Commerçon in Jussieu gen. 403 (1789).
Boehmeria, Jacquin, Stirp Amer. hist. 246 (1763).
Pipturus, Weddell in Ann. des. sc. nat. quatr. sér. I, 196 (1854).
Pouzolzia, Gaudichaud in Freyc. voy. Bot. 503 (1826).
(Memorialis, Hyrtanandra.)
Parietaria, Tournefort, Inst. 509, t. 289 (1700); from C. Bauhin (1623). (Freirea.)
Australina, Gaudichaud in Freyc. voy. Bot. 505 (1826).
Fleurya, Gaudichaud in Freyc. voy. Bot. 497 (1826).
Urtica, Tournefort, Inst. 234, t. 308 (1700); from Plinius.
Laportea, Gandichaud in Freyc. voy. Bot., 498 (1826).

Cupuliferae.

Richard, Anal. des fr. 32 et 92 (1808).

Fagus, Tournefort, Inst. 584, t. 351 (1700) from Camerarius (1586).
Balanops, Baillon, hist. des. pl. VI, 237 and 258 (1876).

Casuarineae.

Mirbel, in Ann. du Mus. XVI, 451 (1810).

Casuarina, Rumphius, herb. Amboin. III, 87, t. 58 (1743).

Piperaceae.

Richard in Humb., Bonpl. & Kunth, Nov. gen. I 46 (1815).

Piper, Linné, Gen. 333 (1737) from C. Bauhin (1623).
(Macropiper.)
Peperomia, Ruiz et Pavon, Fl. Peruv. et Chil. Prodr. 8 (1794).

Podostemoneae.

Richard in Humb., Bonpl. et Kunth, Nov. gen. I, 246 (1815).

Genus indeterminatum.

Nepenthaceae.

Reichenbach, Conspectus 45 (1828).

Nepenthes, Linné, syst. nat. 9 (1735); Linné, Gen. 373 (1737).

Aristolochieae.

A. L. de Jussieu, Ann. du Mus. V. 221 (1804)

Aristolochia, Tournefort, Inst. 162, t. 71 (1700) from Hippocrates Theophrastos and Dioscorides.

Balanophoreae.

Richard in Mém. du Mus. VIII, 404 et 429 (1822).

Balanophora, R. et G. Forster, Char. gen. 99, t. 50 (1776).

Viniferae.

J. de St. Hilaire, Expos fam. II, 48, t. 79 (1805).

Vitis, Tournefort, Inst. 613, t. 384 (1700) e Latinis.
(Cissus.)
Leea, Linné, Mant. 17 (1767).

Sapindaceae.

A. L. de. Jussieu, gen. 246 (1789).

Cardiospermum, Linné, syst. nat. 8 (1735); Linné, gen. 17 (1737).
Ganophyllum, Blume, Mus. Bot. Lugd. I, 230 (1850).
Atalaya, Blume, Rumphia III, 186 (1847).
(Pseudatalaya Sapindus partly.)
Diploglottis, J. Hooker in B. et H. Gen. 395 (1862).
Erioglossum, Blume, Bijdr. 229 (1825).
(Pancovia partly.)
Castanospora, F. v. Mueller, Fragm. IX, 92 (1875).
Allophylus, Linné, Amoen acad. 398 (1747).
(Schmidelia.)
Cupania, Plumier, Gen. 45, t. 19 (1703).
(Guioa, Ratonia, Aryteria, Elatostachys, Mischocarpus, Euphoria partly.)
Nephelium, Linné, Mant. 18 (1767).
(Euphoria partly, Alectryon, Spanoghea.)
Heterodendron, Desfontaines in Mém. du Mus. IV, 8 (1818).
Harpullia, Roxburgh, Fl. Ind. ed. Wall. II, 441 (1826).
Akania, J. Hooker in B. et H. Gen. 409 (1862).
Diplopeltis, Endlicher in Hueg. enum. 13 (1837).
Dodonaea, Linné, Gen. 341 (1737).
(Empleurosma.)
Distichostemon, F. v. Mueller in Hook. Kew Misc. IX, 306 (1857).
Blepharocarya, F. v. Mueller, Fragm. XI, 15 (1878).

Malpighiaceae.

Ventenat, Tabl. III, 131 (1799).

Ryossopterys, Blume in Delessert. Ic. III, 21 (1837).
Tristellateia, Petit-Thouars in Roemer. Coll. 205 (1809).

Burseraceae.

Kunth, in Annal. des scienc. nat. II, 346 (1824).

Garuga, Roxburgh, Pl. Corom. III, 5, t. 208 (1819).
Canarium, Rumphius, herb. Amboin II, 145 (1741).
(Sonzaya.)

ANACARDIACEAE.

R. Brown in Tuckey's Congo 431, (1818).

Rhus, Tournefort, Inst. 611, t. 381 (1700) from Hippocrates, Theophrastos, Dioscorides and Plinius.
Euroschinus, J. Hooker in B. et H. Gen. I, 422 (1862).
Rhodosphaeria, Engler, Bot. Jahrbücher I, 423 (1881).
Buchanania, Sprengel in Schrad. Journ. II, 234 (1800).
Semecarpus, Linné, f., Suppl., 25 (1781).
Spondias, Linné, Gen. 365 (1737).

CELASTRINEAE.

R. Brown in Flind. voy. II, App. 554 (1814).

Euonymus, Tournefort, instit. 717, t. 388 (1700) from Theophrastos and Plinius. (Evonymus.)
Celastrus, Linné, Gen. 59 (1737).
Gymnosporia, Wight and Arnott, Prodr. 159 (1834).
Leucocarpum, A. Richard, Sert. Astrol. 46 (1834).
(Denhamia, Leucocarpon.)
Elaeodendron, J. F. Jacquin in Nov. Act. Helv. I, 36 (1737).
Caryospermum, Blume, Mus. bot. Lugd. I, 175 (1850).
Siphonodon, Griffith, in Calcutta, Journ. IV, 150 (1843).
Hippocratea, Linné, Gen. 363 (1737).
Salacia, Linné, Mant. II, 159 (1771).

STACKHOUSIEAE.

R. Brown in Flind. voy. II, App. 555 (1814).

Stackhousia, Smith in Transact. Linn. Soc. IV, 218 (1798).
(Tripterococcus, Plokiostigma.)
Macgregoria, F. v. Mueller, Fragm. VIII, 160 (1874).

FRANKENIACEAE.

A. de St. Hilaire, Bull. soc philom. 22 (1815).

Frankenia, Linné, Gen. 129 (1737).

PLUMBAGINEAE.

A. L. de. Jussieu, Gen. 22 (1789).

Plumbago, Tournefort, Inst., 140, t. 58 (1700).
Statice, Linné, Gen. 88 (1737).
(Taxanthema.)
Aegialitis, R. Brown, Prodr. 426 (1810).
(Aegialinites.)

Portulaceae.

A. L. de Jussieu, Gen. 312 (1789).

Portulaca, Tournefort, Inst. 236, t. 118 (1700) from l'Obel (1581).
Claytonia, Gronovius in Linné, Gen. 339 (1737). (Calandrinasi Talinum.)
Montia, Micheli, Nov. pl. gen. 17, t. 13 (1729).

Caryophylleae.

Scopoli, Intr. 329 (1777), from B. de Jussieu (1759).

Stellaria, Linné, Sp. plant. 421 (1753).
Sagina, Linné, syst. nat. 8 (1735); Linné, Gen. 118 (1737).
Colobanthus, Bartling, Reliq. Haenk. II, 13, t, 49 (1830).
Saponaria, Linné, Gen. 130 (1737) from Camerarius (1587).
(Gypsophila.)
Spergularia, Persoon, synops. pl. I, 504 (1805).
(Lepigonum, Arenaria partly.)
Drymaria, Willdenow in Roem. et Schult. Syst. V, 406 (1819).
Polycarpon, Loeffling in Linné. Syst. ed. X, 881 (1759).
Polycarpaea, Lamarck in Journ. d'hist. nat. II, 8, t. 25 (1792).
(Aylmeyera.)
Scleranthus, Linné, Gen. 130 (1737).
(Mniarum.)

Salsolaceæ.

Linné, Class. pl. 507 (1738).

Rhagodia, R. Brown, Prodr. 408 (1810).
Chenopodium, Tournefort, Inst. 506, t. 288 (1700).
(Blitum, Ambrina.)
Dysphania, R. Brown, Prodr. 411 (1810).
Atriplex, Tournefort, Inst. 506, t. 286 (1700) from l'Obel (1581).
(Obione, Theleophyton.)
Enchylæna, R. Brown, Prodr. 408 (1810).
Kochia, Roth in Schrad. Journ. Bot. I, 303 (1799).
(Maireana, Sclerochlamys.)
Didymanthus, Endlicher, Nov. stirp. dec. 7 (1839).
Bassia, Allioni, Misc. Taurin. III, 177, t. 4, f. 2 (1766).
(Chenolea, Sclerolæna, Anisacantha, Echinopsilon, Kentropsis, Dissocarpus, Eriochiton, Osteocarpum).
Babbagia, F. v. Mueller, Report on Plants of Babbage's Exped. 21 (1858).
Threlkeldia, R. Brown, Prodr. 409 (1810).
Salicornia, Tournefort, Corol. 51, t. 485 (1703).
(Halocnemon, Arthrocnemon, Tecticornia, Pachycornia.)
Suæda, Forskael, Fl. Ægypt. Arab. 69 (1775).
(Chenopodium partly, Schoberia, Chenopodina.)
Salsola, Linné, Gen. 67 (1737) from Cesalpini.

Amarantaceæ.

A. L. de Jussieu, Gen. 87 (1789).

Polycnemum, Linné, Gen. ed. sec. 21 (1742).
(Hemichroa.)
Euxolus, Rafinesque, Fl. Tell. 42 (1836).
Amarantus, Dodoens, stirp. hist. pempt. 185 (1583).
Ptilotus, R. Brown, Prodr. 415 (1810).
(Trichinium, Goniotriche, Hemisteirus, Arthrotrichum.)
Achyranthes, Linné, Gen. 34 (1737).
Nyssanthes, R. Brown, Prodr. 418 (1810).
Alternanthera, Forskael, Fl. Ægypt. Arab. 28 (1775).
(Telanthera.)
Gomphrena, Linné, Gen. 69 (1737).
(Philoxerus.)
Deeringia, R. Brown, Prodr. 413 (1810).
(Lestibudesia partly, Celosia partly, Lagrezia.)

Phytolacceæ.

R. Brown, Narr. Exp. Cong. App. 454 (1818)

Monococcus, F. v. Mueller, Fragm. I, 47 (1858).
Didymotheca, J. Hooker in Lond. Journ. of Bot. VI, 278 (1847).
(Cyclotheca.)
Gyrostemon, Desfontaines in Mém. du Mus. VI, 16, t. 6 (1820).
Codonocarpus, Cunningham in Hook. Bot. Misc. I, 244 (1830).
(Hymenotheca.)
Tersonia, Moquin-Tandon in De Cand. Prodr. XIII, part. sec. 40 (1849).
Cypselocarpus, F. v. Mueller, Fragm. VIII, 36 (1873).

Ficoideæ.

A. L. de Jussieu, Gen. 315 (1789).

Mesembrianthemum, Breyn, Prodr. alt. 67 (1689).
Tetragonia, Linné, syst. nat. 9 (1735); Linné, Gen. 144 (1737).
(Tetragonella.)
Aizoon, Linné, Gen. 161 (1737). (Aizoum.)
Gunnia, F. v. Mueller, Report on Plants of Babbage's Exped. 9 (1858).
Sesuvium, Linné, Syst. ed. X 1058 (1759).
Zaleya, N. L. Burman, Fl. Ind. 110, t. 31 (1768).
Trianthema, Sauvage, Meth. fol. 127 (1751).
(Ancistrostigma.)
Pamatotheca, F. von Mueller, Frag. X, 72 (1876).
Macarthuria, Huegel, enumerat. 11 (1837).
Mollugo, Linné, Gen. 336 (1737).
(Glinus, Trigastrotheca).

Polygonaceæ.

A. L. de Jussieu, Gen. 82 (1789) from B. de Jussieu (1759).

Emex, Necker, Elem. Bot. II, 214 (1790). (Perhaps immigrated.)
Rumex, Linné, Gen. 105 (1737) from Plinius.
Polygonum, l'Obel, stirp. hist. 228 (1576) from Dioscorides and Plinius.
Muehlenbeckia, Meisner, Gen. pl. vasc. 316 (1840).

Nyctagineæ.

A. L. Jussieu, Gen. 90 (1789).

Boerhaavia, Vaillant, Serm. 50 (1718).
Pisonia, Plumier, Gen. 7 t. 11 (1703).

CHORIPETALEÆ PERIGYNÆ.

F. v. Mueller in Woolls's pl. of the neighb. of Sydney, 18 (1880).

Connaraceæ.

R. Brown in Tuckey's Narr. exp. Cong. App. 431 (1818).

Rourea, Aublet, Hist. pl. Guian. I, 467 (1775).
Tricholobus, Blume, Mus. bot. Lugd. I, 15, 237 (1850).

Leguminosæ.

Haller, Enum. stirp. Helv. II, 565 (1742).

Jansonia, Kippist in Gard. Chron. 19 (1847).
(Cryptosema.)
Brachysema, R. Brown in Ait. on hort. Kew, ed. sec. III, 10 (1811).
(Leptosema, Kaleniczenkia, Burgesia.)
Oxylobium, Andrews, Bot. Rep. t. 492 (1809).
(Chorizematis subgenus, Callistachys, Podolobium.)
Chorizema, Labillardiere, Voy. I, 405 (1798). (Orthotropis.)
Gastrolobium, R. Brown in Ait. Hort. Kew, ed. sec. III, 16 (1811).
Isotropis, Bentham in Huegel enum. pl. Austr. occid., 28 (1837).
Mirbelia, Smith in Koenig and Sims, Ann. of bot. I, 511 (1805).
(Dichosema, Oxycladium.)
Gompholobium, Smith in Transact. Linn. Soc. IV, 220 (1798).
Burtonia, R. Brown in Ait. hort. Kew ed. sec. III, 13 (1811).
Jacksonia, R. Brown in Ait. hort. Kew ed. sec. III, 12 (1811).
(Piptomeris.)
Sphaerolobium, Smith in Koenig and Sims, Ann. of Bot. I, 509 (1805). (Roëa.)

Viminaria, Smith in Koenig and Sims, Ann. of Bot. I, 507 (1805).
Daviesia, Smith in Transact. Linn. Soc. IV, 222 (1798).
Aotus, Smith in Koenig and Sims, Ann. of Bot. I, 504 (1805).
Phyllota, De Candolle, Prodr. II, 113 (1825).
(Urodon.)
Pultenaea, Smith, Specim. of Bot. of New Holl. 35 (1793).
(Euchilus, Spadostyles, Bartlingia.)
Latrobea, Meissner in Lehm. pl. Preiss. II, 219 (1847).
(Leptocytisus.)
Eutaxia, R, Brown in Ait. hort. Kew ed. sec. III, 16 (1811).
(Sclerothamnus.)
Dillwynia, Smith in Koenig and Sims, Ann. of Bot. I, 510 (1805).
Platylobium, Smith in Tranact. Linn. Soc. II, 350 (1794). (Cheilococca.)
Bossiaea, Ventenat, Hort. Cels. I, 7, t. 7 (1800).
(Lalage, Scottia.)
Templetonia, R. Brown in Ait. hort. Kew ed. sec. IV, 269 (1812).
Hovea, R. Brown in Ait. hort. Kew ed. sec. IV, 275 (1812).
(Poiretia, Plagiolobium, Platychilum.)
Nematophyllum, F. v. Mueller in Hooker's Kew Misc. IX, 20 (1857).
Goodia, Salisbury, Parad. Lond. t. 41 (1806).
Crotalaria, Hermann, Hort. Acad. Lugd. Bat. 196–202, t. 197–203 (1687). (Pentadynamis.)
Rothia, Schreber, Gen. pl. 53 (1791). (Westonia.)
Trigonella, Linné, Gen. 351 (1737).
Lotus, Tournefort, Inst. 402, t. 227 (1700), from Casp. Bauhin (1623).
Psoralea, Royen, plant. hort. Lugd. 372 (1740).
Indigofera, Linné, Hort. Cliff. 487 (1737).
Ptychosema, Bentham in Lindl. Bot. Regist. XXV, (1839).
Lamprolobium, Bentham, Fl. Austr. II, 202 (1864).
Tephrosia, Persoon, Synops. pl. II, 328 (1807).
Wistaria, Nuttall, Gen. N. Amer. pl. II, 115 (1818).
(Milletia.)
Sesbania, Scopoli, Introd. 308 (1777).
(Agati.)
Carmichaelia, R. Brown in Bot. Regist. t. 912 (1825).
Clianthus, Banks and Solander in G. Don, Dichlam. pl. 468 (1832); indicative. (Donia.)
Streblorrhiza, Endlicher, Prodr. fl. Norfolk, 92 (1833).
Swainsonia, Salisbury, Parad. Lond. t. 28 (1806).
(Cyclogyne, Diplolobium.)
Glycyrrhiza, Tournefort, Inst. 389, t. 210 (1700) from Dioscorides and Plinius. (Clidanthera.)

Ormocarpum, Palisot, Fl. d'Owar. I, 95 t. 58 (1805).
Aeschymomene, Linné, Gen. 350 (1837).
Smithia, Aiton, Hort. Kew III., 469 (1789).
Zornia, Gmelin, Syst. Nat. 1076 (1791).
Desmodium, Desvaux, Journ. Bot. III, 122 (1813) (Dicerma).
Pycnospora, R. Brown in Wight & Arnott, Prodr. I. (197) (1834).
Uraria, Desvaux, Journ. Bot. III, 122 (1813).
Lourea, Necker, Elem. Bot. III, 17 (1790).
Alysicarpus, Necker, Elem. Bot. III, 15 (1790).
Lespedeza, Cl. Richard in Micheaux, Fl. Bor. Am. II. 70 (1803).
Clitoria, Linné, Gen. 216 (1737) from Petiver.
Glycine, Linné, Gen. 349 (1737). (Leptolobium, Leptocyamus.)
Kennedya, Ventenat, jardin de Malmais. II, t. 104–106 (1804). (Caulinia, Moench, 1802, Hardenbergia, Physolobium, Zichya, Amphodus.)
Erythrina, Linné, Gen. 216 (1737).
Strongylodon, Vogel in Linnaea X, 585 (1836).
Mucuna, Marcgraf, Hist. nat. Brazil. 18 (1648).
Galactia, P. Browne, Civ. and Nat. hist. of Jamaica, 298 (1756).
Canavalia, De Candolle, Prodr. II, 403 (1825). (Canavali.)
Phaseolus, Tournefort, Inst. 412, t. 232 (1700) from Dioscorides and Columella.
Vigna, Savi, Dissert. 6 (1824).
Dolichos, Linné, Gen. 222 (1737).
Dunbaria, Wight & Arnott, Prodr. I, 258 (1834).
Cajanus, De Candolle, Catal. hort. Monsp. 85 (1813). (Cajan, Atylosia.)
Rhynchosia, Loureiro, Fl. Cochinch. II. 460 (1790).
Eriosema, De Candolle, Prodr. II, 388 (1825).
Flemingia, Roxburgh, Pl. Corom. III, 44 (1819).
Abrus, Vesling de plant. Aegypt, 25 (1638).
Dalbergia, Linné f. Suppl. 52 (1781).
Lonchocarpus, Humboldt, Bonpland & Kunth, Nov. Gen. VI, 383 (1823).
Derris, Loureiro, Fl. Cochinch. II, 432 (1790). (Brachypterum.)
Pongamia, Lamarck, Illustr. t. 603 (1793).
Sophora, Linné, Gen. 125 (1737).
Calpurnia, E. Meyer, Comm. pl. Afr. I, 2 (1835).
Castanospermum, Cunningham in Hooker's Bot. Misc. I, 241 t. 51 (1830).
Barklya, F. v. Mueller, Fragm. I, 109 (1859).
Caesalpina, Plumier, Nov. Gen. 28, t. 9 (1703). (Guilandina, Cesalpinia.)
Mezoneuron, Desfontaines in Mém. du Mus. IV, 245 (1818).
Pterolobium, R. Brown in Salt. Abyssin. 65 (1814).
Peltophorum, Vogel in Linnaea XI, 406 (1837).

Cassia, Tournefort, Inst. 619, t. 392 (1700) from Plumier (1693. (Cathartocarpus.)
Petalostylis, R. Brown in Sturt's exp. App. 79 (1849).
Labichea, Gaudichaud in De Candolle, Prodr. II, 507 (1825).
Tamarindus, Tournefort, Inst. 660, t. 445 (1700) from C. Bauhin (1623).
Bauhinia, Plumier, nov. pl. Amer. Gen. 22, t. 13 (1703).
Afzelia, Smith in Transact. Linn. Soc. IV, 221 (1798).
Cynometra, Linné in Act. Soc. Ups. 78 (1741).
Erythrophlaeum, Afzelius in Tuck. Cong. 430 (1818). (Laboucheria.)
Entada, Adanson, Fam. II, 318 (1763).
Adenanthera, Royen in Linné, Coroll. 7 (1737).
Neptunia, Loureiro, Fl. Cochinch. II, 653 (1790). (Dichrostachys.)
Acacia, Tournefort, Inst. 605, t. 375 (1700) from Dioscorides and Plinius. (Vachellia, Chithonanthus, Tetracheilus, Mimosa partly.)
Albizzia, Durazzini in Mag. Tosc. III, part IV, 13 (1772). (Zygia, Pithecolobium, Catarmion, Calliandra, Enterolobium, Serianthes.)
Archidendron, F. v. Mueller, Fragm. VI, 201 (1868).

Rosaceæ.

A. L. de Jussieu, Gen. 334 (1789) from B. de Jussieu (1759).

Parinarium, A. L. de Jussieu, Gen. 342 (1789).
Stylobasium, Desfontaines, Mem. du Mus. V. 37 (1819) (Macrostigma.)
Geum, Linné, Gen. 148 (1737) from Plinius (Sieversia).
Potentilla, Linné, Gen. 147 (1737) from Camerarius (1586).
Rubus, Tournefort, Inst. 615 t. 385 (1700) from Plinius.
Agrimonia, Tournefort, Inst. 301 t. 155 (1700).
Alchemilla, Linnè, Gen. 30 (1737) from C. Bauhin (1623). (Alchimilla.)
Acaena, Mutis in Linn. Mant. II, 200 (1771). (Ancistrum.)

Saxifrageæ.

Ventenat, Tabl. III, 277 (1799).

Argophyllum, R. & G. Forster, Char. gen. 29, t. 15 (1776).
Abrophyllum, J. Hooker in B. and H. gen. I, 647 (1865). (Brachynema.)
Cuttsia, F. v. Mueller, Fragm. VI, 188 (1868).
Colmeiroa, F. v. Mueller, Fragm. VII, 149 (1871.)
Davidsonia, F. v. Mueller, Fragm. VI, 4 (1867).
Quintinia, A. de Candolle, Mon. Campan. 92 (1830).
Polyosma, Blume, Bijdr. 13, 658 (1825).

Anopterus, Labillardière, Nov. Holl. pl. specim. I, 86 (1804).
Callicoma, Andrews, Bot. reposit. t. 566 (1809). (Calycomis partly.)
Anodopetalum Cunningham in Endl. gen. 818 (1839).
Aphanopetalum, Endlicher, Nov. Stirp. dec. I, 34 (1839). (Platyptelia.)
Ceratopetalum, Smith, specim. of Bot. of New. Holl. I, 9 (1793).
Schizomeria, D. Don in Endinb. phil. journ. IX, 94 (1830).
Acrophyllum, Bentham in Maund & Henslow's Bot. II, 95 (1840). (Calycomis partly.)
Geissois, Labillardière, Sertum Austro-Caled., 50 (1825).
Weinmannia, Linné, Syst. ed. X, 1005 (1759). (Ackama.)
Gillbeea, F. v. Mueller, Fragm. V, 17 (1865).
Tetracarpaea, Hooker, Icon. t. 264 (1840).
Eucryphia, Cavanilles, Icon. IV, 48 t. 372 (1797). (Carpodontos.)
Bauera, Banks and Kennedy in Andrews Bot. reposit. t. 198 (1793).
Eremosyne, Endlicher in Huegel, enum. pl. austr. occ. 53 (1837).
Cephalotus, Labillardière, Nov. Holl. pl. specim. II, 7 (1806).

Crassulaceae.

De Candolle, Bull. de la Soc. philom. n. 49, p. 1 (1801).

Tillaea, Micheli, Nov. gen. 22, t. 20 (1729). (Bulliarda.)

Hamamelideae.

R. Brown in Abel's narr. Journ. Chin. 374 (1818)

Genus indeterminatum.

Onagreae.

Adanson, Fam. pl. II, 81 (1763), from B. de Jussieu (1759).

Oenothera, Linné syst. nat. 8 (1735); Linné, Gen. p. 112 (1737).
Epilobium, Dillenius in Linné syst. nat. 8 (1735), from Gesner (1542).
Jussieua, Linné, Gen. 126 (1737). (Jussiaea).
Ludwigia, Linné, Coroll. 3 (1737).

Salicarieae.

Adanson, Fam. pl. II, 232 (1763) from B. de Jussieu (1759).

Rotala, Linné, Mant. II, 143 (1771).
Ammannia, Houston in Linné, Gen. 337 (1737).
Lagerstroemia, Linné, Syst. ed. X, 1076 (1759).
Lythrum, Linné, syst. natur. 8 (1735).
Nesaea, Commerçon in A. L. de Juss. Gen. 332 (1789).
Pemphis, R. G. Forster, Char. gen. 67, t. 34 (1776).
Lawsonia, Linné, Gen. pl. 111 (1737).

Halorageae.

R. Brown in Flind. voy. II, 549 (1814).

Loudonia, Lindley, Bot. Reg. XXV, App. XLII. (1839).
(Glischrocaryon.)
Haloragis, R. et G. Forster, Char. gen. 61, t. 31 (1776).
(Cercodia, Goniocarpus.)
Meionectes, R. Brown in Flind. voy. II, 550 (1814).
Myriophyllum, l'Ecluse, rar. stirp. hist. II. 252 (1583) from Dioscorides.
Gunnera, Linné, Mantiss. 16 (1767).
(Milligania.)
Ceratophyllum, Linné syst. nat. 9 (1735), Linné, gen. 290 (1737).
Callitriche, Linné, syst. nat. edit. sext. 82 (1748).

Rhizophoreae.

R. Brown in Flind. voy. II. 549 (1814).

Rhizophora, Linné, gen. 137 (1737).
Ceriops, Arnott in Jardine's Ann. of nat. hist., I, 363 (1838).
Bruguiera, Lamarck, Dict. IV, 696 t. 397 (1796).
Carallia, Roxburgh in Flind. voy. II, 549 (1814).

Combretaceae.

R. Brown, Prodr. I, 351 (1810).

Terminalia, Linné, Mant. 21 (1767). (Chuncoa.)
Lumnitzera, Willdenow, Verh. der Ges. nat. Freund. Berl. IV, 186 (1803).
Macropteranthes, F. v. Mueller, Fragm. III, 91 (1862).
Gyrocarpus, Jacquin, Stirp. Amer. hist., 282 (1763).

Myrtaceae.

Adanson, Fam. pl. II, 86 (1753) from B. de Jussieu (1759).

Actinodium, Schauer in Linnæa X, 311 (1835).
(Triphelia.)
Darwinia, Rudge in transact. Linn. Soc. XI, 299 (1813).
(Genetyllis, Homoranthus, Chaemalaucium, Hedaroma, Polyzone, Francisia, Decalophium, Schuermannia, Cryptostemon.)
Verticordia, De Candolle in Dict. class. XI, 400 (1826).
(Chrysorrhoea.)
Pileanthus, Labillardière, Nov. Holl. pl. specim. II, 11 (1806).
Calycothrix, Labillardière, Nov. Holl. pl. specim. II, 8 t. 146 (1806). (Calytrix, Calythrix.)
Lhotzkya, Schauer in Linnaea X, 309 (1835).
Thrytomene, Endlicher, Ann. des Wien. Mus. II, 192 (1838).
(Micromyrtus, Homalocalyx, Paryphantha, Astraea, Eremopyxis.)

Wehlia, F. v. Mueller. Fragm. X, 22 (1876).
Baeckea, Linné, sp. pl. I, 358 (1753).
(Jungia, Imbricaria, Scholtzia, Schidiomyrtus, Rinzia, Euryomyrtus, Camphoromyrtus, Tetrapora, Harmogia, Oxymyrrhine, Babingtonia, Ericomyrtus, Piptandra, Anticoryne.)
Astartea, De Candolle in Diction. class. XI, 400 (1826).
Hypocalymma, Endlicher, in Huegel, enum. pl. austr. orr. 51 (1837).
Punicella, Turczaninow in Bull. de l'Acad. Petersb, X, 411 (1852).
(Balaustion, Cheynia.)
Agonis, De Candolle, Prod. III, 226 (1828).
(Billiottia.)
Leptospermum, R. et G. Forster, Char. gen. 71 t. 36 (1776).
(Fabricia, Homalospermum, Pericalymma.)
Kunzea, Reichenbach, Consp. 174 (1828).
(Salisia, Pentagonaster.)
Callistemon, R. Brown in Flind. voy. II, 547 (1814).
Melaleuca, Linné, Mant. 14 (1767).
(Gymnagathis, Asteromyrtus.)
Conothamnus, Lindley, Bot. Regist. XXV, app. p. IX (1839).
Beaufortia, R. Brown in Ait. hort. Kew, sec. ed. IV, 418 (1812).
(Schizopleura.)
Regelia, Schauer in Linnaea XVII, 243 (1843).
Phymatocarpus, F. v. Mueller, Fragm. III, 121 (1862).
Calothamnus, Labillardière, Nov. Holl. pl. specim. II, 25 (1806).
(Billottia.)
Lamarchea, Gaudichaud in Freyc. inet. voy. bot. 483 (1826).
Eremaea, Lindley, Bot. Reg. XXV, app. XI (1839).
Angophora, Cavanilles, Icon. IV, 21, t. 331 (1797).
Eucalyptus, L'Héritier, Sertum anglicum 18 (1788).
(Symphyomyrtus, Eudesmia.)
Tristania, R. Brown in Ait. hort. Kew. sec. ed. IV, 417 (1812).
(Lophostemon, Tristaniopsis.)
Metrosideros, Banks in Gaertner, de Fruct. I, 170 (1788).
(Syncarpia, Lysicarpus, Xanthostemon, Nania, Kamptzia, Fremya, Cloezia.)
Backhousia, Hooker and Harvey in Bot. Mag. t. 4133 (1845).
Osbornia, F. v. Mueller, Fragm. III, 31 (1862).
Myrtus, Tournefort, Inst. 640, t. 409 (1700) from Plinius.
Rhodomyrtus, de Candolle Prodr. III, 240 (1828.)
Rhodamnia, Jack in Hooker, comp. to the Bot. Mag. I, 153 (1835).
Fenzlia, Endlicher, Atacta bot. 19, t. 17 et 18 (1833).
Decaspermum, R. et G. Forster, Char. gen. 73 (1776).
(Nelitris.)
Eugenia, Micheli, Nov. pl. gen. 226, t. 108 (1729).
(Plinia, Plumier, 1703, Acmene, Jambosa, Syzygium.)
Acicalyptus, A. Gray, New gen. Un. St. exped. 9 (1853).

Barringtonia, R. et G. Forster, Char. gen. 75, t. 38 (1776).
(Stravadium.)
Careya, Roxburgh, Pl. Corom. III, 13, t. 217 (1816).
Sonneratia, Linné fil. Suppl. 38 (1781).

Melastomaceae.

A. L. de Jussieu, gen. 328 (1789).

Osbeckia, Linné, Spec. pl. 345 (1753).
Otanthera, Blume in Flora, Regensburg, II, 488 (1831).
Melastoma, Burman, Fl. Zeyl. 72 (1737).
Memecylon, Linné, Fl. Zeyl. app. 9 (1747).

Rhamnaceae.

A. L. de Jussieu, gen. 376 (1789) B. de Jussieu (1759).

Ventilago, Gaertner de Fruct, I, 223, t. 49 (1788).
Zizyphus, Tournefort, Inst. 627, t. 403 (1700) from Plinius.
Dallachya, F.v. Mueller, Fragm. IX, 140 (1875).
(Rhamnus partly.)
Berchemia, Necker, Elem. bot. II, 122 (1790).
Colubrina, L. C. Richard in Ann. des sc. nat. X, (1827).
Alphitonia, Reissek in Endlicher, gen. 1098 (1840).
Emmenospermum, F.v. Mueller, Fragm. III., 63 (1862).
Pomaderris, Labillardière, Nov. Holl. pl. specim. I, 61, t. 86 (1804).
Cryptandra, Smith in Trans. Linn. Soc. IV, 217 (1798).
(Trymalium, Spyridium, Stenanthemum, Wichurea, Stenodiscus).
Colletia, Commerçon in A. L. de Jussieu, gen. 380 (1789).
(Discaria, Tetrapasma).
Gouania, Jacquin, Stirp. Amer. hist. 263, t. 179 (1763).

Araliaceae.

(Umbelliferarum subordo.)

Ventenat, Tabl. III (1799).

Astrotricha, de Candolle, Coll. Mém. V, 29, t. 5 et 6 (1829).
Porospermum, F. v. Mueller, Fragm. VII, 94 (1870).
Panax, Linné, System. nat. 8 (1735).
(Nothopanax.)
Motherwellia, F. v. Mueller, Fragm. VII, 107 (1871).
Cissodendron, Seemann, Journ. bot. II, 303 (1864).
(Hedera partly, Irvingia, Kissodendron.)
Heptapleurum, Gaertner, de Fruct. II, 472, t. 178 (1791).
(Paratropia.)
Brassaia, Endlicher, Nov. Stirp. decad. I, 89 (1839).
Mertya, R. et G. Forster, Char. gen. 119, t. 60 (1776).
(Bothryodendron.)
Mackinlaya, F. v. Mueller, Fragm. IV, 120 (1864).

Umbelliferæ.

Morison, Hist. pl. II, lib. 3, sect. 1 (1680).

Hydrocotyle, Tournefort, Inst. 328, t. 173 (1700).
Didiscus, de Candolle in Bot. Mag., t. 2857 (1828).
(Huegelia, Dimetopia, Pritzelia, Cesatia, Hemicarpus).
Trachymene, Rudge in Transact. Linn. Soc. X, 300 (1811).
(Siebera, Fischera, Platysace, Platycarpidium.)
Xanthosia, Rudge in Transact. Linn. Soc. X, 361 (1811).
(Leucolaena, Schoenolaena, Pentapeltis).
Azorella, Lamarck, Dict. encycl. II, 344 (1783).
(Fragosa, Pozoa, Microsciadium, Schizeilema, Oschatzia, Centella partly, Dichopetalum.)
Huanaca, Cavanilles, Icon. VI. 18, t. 528 (1801).
(Diplaspis, Pozoopsis.)
Actinotus, Labillardière, Nov. Holl. pl. spec. I, 67, t. 92 (1804).
(Hemiphues, Eriocalia, Holotome.)
Eryngium, Tournefort, Inst. 327, t. 173 (1700) from Theophrastos and Dioscorides.
Apium, Tournefort, Inst. 305, t. 160 (1700) from Dodoens (1583).
Sium, Tournefort, instit. 308, t. 162 (1700) from C. Bauhin (1623).
Seseli, Rivinus in Ruppius, Fl. Jenens, 267 (1718).
Crantzia, Nuttall, gen. Amer. I, 177 (1818).
(non Scopoli 1777), Crantziola, F. v. M.
Oenanthe, Tournefort, Inst. 312, t. 166 (1700).
Aciphylla, R. et G. Forster, Char. gen. 135, t. 68 (1776).
(Ligustici subgenus.)
Daucus, Tournefort, Inst. 307, t. 161 (1700) from l'Ecluse (1576).
Oreomyrrhis, Endlicher, gen. 787 (1839).
(Caldasia partly).

SYNPETALEAE PERIGYNAE.

Aquifoliaceae.

De Candolle, Théor. élém. I, 217 (1813).

Byronia, Endlicher, Ann des Wien. Mus. I, 184 (1836).
Ilex, Linné, gen. pl. 33 (1737) from C. Bauhin (1623).

Olacineae.

Mirbel in Bull. soc. philom. 377 (1813).

Ximenia, Plumier, Gen. 6, t. 21 (1703).
Olax, Linné, Amoen. acad. I. Ed. 387 (1747).
(Spermaxyrum.)
Cansjera, A. L. de Jussieu, Gen. 448 (1789).
Opilia, Roxburgh, pl. Corom. II, 31, t. 158 (1799).

Phlebocalymma, Griffith in B. & J. H. Gen. I, 353 (1862). (Phlebocalymna).
Pennantia, R. et G. Forster, Char. gen. 133, t. 67 (1776).
Apodytes, E. Meyer in Hook. journ. of bot. III, 387 (1841).
Villaresia, Ruiz et Pavon, Prodr. 35 (1794).
Gomphandra, Wallich, Catal. n. 3718 and 7204 (1832).

Elaeagneae.

R. Brown, Prodr. I, 350 (1810).

Elaeagnus, Tournefort, Coroll. 53, t. 489 (1703) from Camerarius (1586).

Santalaceae.

R. Brown, Prodr. I, 350 (1810).

Thesium, Linné, Gen. pl. 60 (1737).
Santalum, Linné, Gen. ed. II, 165 (1742) from C. Bauhin (1623). (Fusanus, Eucarya).
Choretrum, R. Brown, Prodr. 354 (1810).
Leptomeria, R. Brown, Prodr. 353 (1810).
Omphacomeria, Endlicher, Gen. 326 (1838).
Anthobolus, R. Brown, Prodr. 357 (1810).
Exocarpos, Labillardière, Relat. du voy. á la rech. de la Pérouse (1798). (Exocarpus.)

Loranthaceae.

A. L. de Jussieu, Ann. du Mus. XII, 292 (1808).

Viscum, Tournefort, Inst. 609, t. 380 (1700) from Camerarius (1586).
Notothixos, Oliver in Journ. Linn. Soc. VII, 104 (1865).
Loranthus, Linné, Syst. edit. sec. 22 (1740).
Atkinsonia, F. v. Mueller, Fragm. V, 34 (1865).
Nuytsia, R. Brown in Journ. of the Geogr. Soc. I, 17 (1831).

Proteaceae.

A. L. de Jussieu, Gen. 78 (1789).

Petrophila, R. Brown in Transact. Linn. Soc. X, 67 (1809).
Isopogon, R. Brown in Transact. Linn. Soc. X, 70 (1809).
Adenanthos, Labillardière, Nov. Holl. pl. spec. I, 28, t. 36 (1804).
Simsia, R. Brown in Transact. Linn. Soc. X, 152 (1809). (Stirlingia.)
Synaphea, R. Brown in Transact. Linn. Soc. X, 155 (1809).
Conospermum, Smith in Transact. Linn. Soc. IV, 213 (1798).
Franklandia, R. Brown in Transact. Linn. Soc. X, 157 (1809).
Symphyonema, R. Brown in Transact. Linn. Soc. X, 157 (1809). (Symphionema.)

Bellendena, R. Brown in Transact. Linn. Soc. X, 166 (1809).
Agastachys, R. Brown in Transact. Linn. Soc. X, 158 (1809).
Cenarrhenes, Labillardière, Nov. Holl. pl. spec. I, 36 t. 50 (1804).
Persoonia, Smith in Transact. Linn. Soc. IV, 215 (1798).
(Linkia, 1797.)
Macadamia, F. v. Mueller in Transact. phil. Inst. Vict. II, 72 (1857). (Panopsis partly; Andriapetalum partly.)
Helicia, Loureiro, Fl. Cochinch. I, 83 (1790).
Roupala, Aublet, Hist. des pl. de la Guian. I, 83, t. 32. (1775) (Rhopala, Bleasdalea, Adenostephanus partly.)
Xylomelum, Smith in Transact, Linn. Soc. IV, 214 (1798).
Lambertia, Smith in Transact. Linn. Soc. IV, 214 (1798).
Orites, R. Brown in Transact. Linn. Soc. X, 189 (1809).
(Oritina.)
Strangea, Meissner in Hook. Kew. Misc. VII, 66 (1855).
(Molloya).
Grevillea, R., Brown in Transact. Linn. Soc. X. 168 (1809).
(Anadenia, Lysanthe, Stylurus, Manglesia.)
Hakea, Schrader, Sert. Hannov. I, fasc. 3, 27, t. 17 (1797).
(Conchium.)
Carnarvonia, F. v. Mueller, Fragm. VI, 81 (1867).
Buckinghamia F. v. Mueller, Fragm. VI, 248 (1868).
Darlingia, F. v. Mueller, Fragm. V, 152 (1866).
Cardwellia, F. v. Mueller, Fragm. V, 24, 38, 73, 152 (1865-6).
Stenocarpus, R. Brown in Transact. Linn. Soc. X, 201 (1809).
(Cybele, Agnostus.)
Lomatia, R. Brown in Transact. Linn. Soc. X, 199 (1809).
(Tricondylus.)
Embothrium, R. et G. Forster, Char. gen. 15, t. 8 (1776).
Telopea, R. Brown in Transact. Linn. Soc. X, 197 (1809).
Banksia, Linné fil. suppl. 15 et 126 (1781).
Dryandra, R. Brown in Transact. Linn. Soc. X, 211 (1809).
(Josephia, Hemiclidia.)

Thymeleae.

A. L. de Jussieu, Gen. 76 (1789).

Pimelea, Banks & Solander in Gaert. de Fruct. I, 186 (1788).
(Thecanthes, Gymnococca, Heterolaena, Calyptrostegia, Macrostegia Banksia Forst. 1776.)
Drapetes, Lamarck, Journ. d'hist. nat. I, 119, t. 10 (1792) (Kelleria, Daphnobryon.)
Wickstroemia, Endlicher, Prodr. fl. Norfolk. 47 (1833.) (Daphne partly.)
Phaleria, Jack in Hook. Comp. to Bot. Mag. I, 156 (1835) (Drymispermum.)

CORNACEAE.

Humboldt, Bonpland & Kunth, Nov. gen. am. III, 430 (1818).

Stylidium, Loureiro, Fl. Cochinch. I, 220 (1790). (Marlea, Rhytidandra, Pseudalangium.)

RUBIACEAE.

A. L. de Jussieu, Gen. 196 (1789) from B. de Jussieu (1759).

Sarcocephalus, Afzelius in Transact. hort. soc. V, 422, t. 18 (1824).
Oldenlandia, Plumier, Gen. 42, t. 36 (1703). (Hedyotis, Synapthantha.)
Dentella, R. et G. Forster, Char. Gen. 25, t. 13 (1776). (Lippaya.)
Ophiorrhiza, Linné, Fl. Zeyl. 190 et 239 (1747).
Abbottia, F. v. Mueller, Fragm. IX, 181 (1875).
Gardenia, Ellis in Phil. Transact. LI, 935, t. 23 (1761).
Randia, Houston in Linn. Hort. Cliff. 485 (1737).
Diplospora, De Candolle, Prodr. IV, 477 (1830). (Discospermum.)
Ixora, Linné, syst. nat. 8 (1735); Linné, Gen. 27 (1737). (Pavetta, Webera, Hylcoryne.)
Coffea, Linné, syst. nat. 8 (1735); Linné, Gen. 55 (1737) from Ray (1691).
Timonius, Rumphius, herb. Amboin. III, 216, t. 140 (1743). (Polyphragmon.)
Scyphiphora, Gaertner f. de Fruct. III, 91, t. 196 (1805). (Epithinia.)
Guettarda, Osbeck in Linn. spec. pl, 991 (1753). (Antirrhoea, Guettardella.)
Hodgkinsonia, F. v. Mueller, Fragm. II, 132 (1861).
Canthium, Lamarck, Dict. I, 602 (1783). (Plectronia partly.)
Morinda, Vaillant, Act. Acad. Paris, 202 (1722).
Coelospermum, Blume, Bijdr. 994 (1826). (Pogonolobus.)
Hydnophytum, Jack in transact. Linn. Soc. XIV, 124 (1823).
Myrmecodia, Jack in Transact. Linn. Soc XIV, 122 (1823).
Lasianthus, Jack in Transact. Linn. Soc. XIV, 125 (1823).
Psychotria, Linné, Syst. ed. X, 929 (1759). (Wragoga, 1737, Grumilia.)
Geophila, D. Don, Prodr. fl. Nepal. 136 (1825).
Coprosma, R. et G. Forster, Char. Gen. 137, t. 69 (1776). (Nertera, Marquisia.)
Opercularia, Gaertner, de Fruct. I, 111, t. 24 (1788).
Pomax, Solander in Gaertner, de Fruct. I, 112 (1788).
Eleuthranthes, F. v. Mueller, Fragm. IV, 92 (1864).
Knoxia, Linné, Fl. Zeyl. 189 (1747).
Spermacoce, Dillenius, Hort. Elth. 369, t. 277 (1732).
Asperula, Ruppius, Fl. Jenens. 5 (1718) from Dodoens (1583).
Galium, Dodoens pemptad. 335 (1583) from Dioscorides.

Caprifoliaceae.

Adanson, Fam. II, 133 (1763).

Sambucus, Tournefort, Inst. 606, t. 396 (1700), from Dodoens (1583). (Tripetelus.)

Passifloreae.

A. L. de Jussieu in Ann. du Mus. VI, 102 (1805).

Passiflora, Plukenet phytograph 202 et 282 t. 104, 210, 211, 212 (1692). (Disemma.)
Modecca, Lamarck, Dict. IV, 208 (1797).

Cucurbitaceae.

Haller, En. stirp. Helv. Praef. 34 (1742).

Trichosanthes, Linné, Gen. 295 (1737).
Lagenaria, Seringe in Mém. de la Soc. Genev. III, 25, t. 2 (1825).
Luffa, Tournefort in Act. Acad. Paris, 84, t. 2 (1706) from Vesling (1638).
Zanonia, Linné, Coroll. 19 (1737).
(Alsomitra.)
Cucumis, Tournefort, Inst. 104, t. 31 (1700) from Plinius.
Benincasa, Savi in Bibl. Ital. IX, 158 (1818).
Momordica, Tournefort, Inst. 103, t. 29 et 30 (1700).
Bryonopsis, Arnott in Hook. Journ. Bot. III, 274 (1841).
(Bryonia partly.)
Melothria, Linné, Coroll. 1 (1737).
(Zehneria, Mukia.)
Sicyos, Linné, syst. nat. 9 (1735); Linné, Gen. pl. 297 (1737).

Compositae.

Vaillant, Act. Acad. Paris, 143 (1718).

Centratherum, Cassini in Bull. de la Soc. Philom. (1817).
Pleurocarpaea, Bentham, Fl. Austr. III, 460 (1866).
Vernonia, Schreber, Gen. II, 541 (1791).
Elephantopus, Vaillant in Act. Acad. Paris, 309 (1719).
Adenostemma, R. et G. Forster, Char. Gen. 89, t. 45 (1776).
Ageratum, Linné, Gen. 247 (1737).
Eupatorium, Tournefort, Inst. 455, t. 259 (1700) from C. Bauhin (1623).
Lagenophora, Cassini in Bull. de la soc. philom. márt. (1818).
(Ixauchenus, Solenogyne, Emphysopus.)
Brachycome, Cassini in Bull. de la soc. philom. 199 (1816).
(Bellidis subgenus, Pacquerina, Brachystephium, Steiroglossa, Silphiospermum.)
Erodiophyllum, F. v. Mueller, Fragm. IX, 119 (1875).

Minuria, De Candolle, Prodr. V, 298 (1836).
(Therogeron, Elachothamnus, Kippistia.)
Calotis R. Brown in Bot. Regist. t. 504 (1820).
(Huenefeldia, Goniopogon, Cheiroloma.)
Aster, Tournefort, Inst. 481, t. 274 (1700) from Dioscorides.
(Olearia, Celmisia, Eurybia, Steetzia.)
Vittadinia, Ach. Richard, Voy. Astrol. bot. 250 (1832).
(Eurybiopsis, Microgyne.)
Podocoma, Cassini in Bull. de la Soc. Philom. 137 (1817).
(Ixiochlamys.)
Erigeron, Linné, Hort. Cliffort. 407 (1737).
(Haplopappus partly.)
Conyza, Lessing, synops. gen. comp. 203 (1832).
Blumea, De Candolle in Guillem. Arch. bot. II, 514 (1833).
Pluchea, Cassini in Bull. de la Soc. Philom. 31 (1817).
(Spiropodium, Eyrea.)
Pterigeron, De Candolle, Prodr. V, 293 (1836).
(Streptoglossa, Oliganthemum.)
Thespidium, F. v. Mueller in Journ. of Landsborough's Exped. app. (1862).
Coleocoma, F. v. Mueller in Hook. Kew Misc. IX, 19 (1857).
Epaltes, Cassini in Bull. de la Soc. Philom. 139 (1818).
(Sphaeromorphaea partly, Ethuliopsis.)
Sphaeranthos, Vaillant in Act. Acad. Paris, 289 (1719).
(Sphaeranthus.)
Pterocaulon, Elliott, Sketch of Bot. of S. Carolin and Georg. II, 323 (1824). (Monenteles.)
Stuartina, Sonder in Linnaea XXV, 521 (1852).
Gnaphalium, Linné, Gen. 250 (1737) from J. & C. Bauhin (1619).
(Euchiton.)
Antennaria, Gaertner, de Fruct. II, 410, t. 167 (1791).
(Raoulia partly.)
Leontopodium, R. Brown in Transact. Linn. Soc. XII, 124 (1817).
(Raoulia partly.)
Pterygopappus, J. Hooker in Lond. Journ. of bot. VI, 120 (1847).
Leptorrhynchos, Lessing, Syn. Compos. 273 (1832).
(Rhytidanthe.)
Ixiolaena, Bentham in Huegel. enumerat. 66 (1837).
Phacellothrix, F. v. Mueller, Fragm. XI, 49 (1878).
Waitzia, Wendland, Collect. pl. II, 13, t. 42 (1808.)
(Viraya, Morna, Pterochaete.)
Helichrysum, Vaillant in Act. Acad. Paris, 290 (1719) from Theophrastos and Dioscorides.
(Elichrysum, Schoenia, Petalolepis, Faustula, Ozothamnus, Swammerdamia, Lawrencella, Argyrophanes, Chrysocephalum, Conanthodium, Xanthochrysum, Argyroglottis, Acanthocladium, Raoulia partly.)

Helipterum, De Candolle, Prodr. VI, 211 (1837).
(Argyrocome, 1822, Pteropogon, Rhodanthe, Xyridanthe, Anisolepis, Hyalosperma, Triptilodiscus, Acroclinium, Monencyanthes, Dimorpholepis, Duttonia, Cassiniola.)
Podotheca, Cassini in Dict. XXIII, 561 (1822).
(Podospermum, Phaenopoda, Lophoclinium.)
Millotia, Cassini in Ann. des scienc. nat. XVII, 416 (1829).
Quinetia, Cassini in Diction. LX, 579 (1830).
Rutidosis, De Candolle, Prodr. VI, 158 (1837).
(Pumilo, Actinopappus, Lepidocoma.)
Ammobium, R. Brown in Bot. Mag. t. 2459 (1824).
Scyphocoronis, A. Gray in Hook. Kew misc. IV, 223 (1852).
Toxanthus, Turczaninow in Bull. Mosc. I, 177 (1851).
(Anthocerastes).
Eriochlamys, Sonder & F. v. Mueller in Linnaea XXV, 488 (1852).
Cassinia, R. Brown in Transact. Linn. Soc. XII, 126 (1817).
(Non zoologorum Apolochlamys, Achromolaena, Chromochiton.)
Humea, Smith, Exot. bot. 1. t. 1 (1804).
(Haeckeria, Calomeria.)
Acomis, F. v. Mueller, Fragm. II, 89 (1860).
Pithocarpa, Lindley, Bot. Regist. XXV, app. 23 (1839).
Ixodia, R. Brown in Ait. hort. Kew, sec. ed. IV, 17 (1812).
Myriocephalus, Bentham in Hueg. Enum. 61 (1837).
(Hyalolepis, Antheidosorus, Gilberta, Lamprochlaena, Elachopappus, Polycalymma; some readily to be restituted.)
Angianthus, Wendland, Collect. pl. II, 31 (1809).
(Siloxerus, Styloncerus, Ogcerostylus, Cylindrosorus, Phyllocalymma, Skirrophorus, Chrysocoryne, Eriocladium, Pogonolepis, Piptostemma, Epitriche, Gamozygis, Cephalosorus, partly, Hyalochlamys, Dithyrostegia, Pleuropappus; some readily to be restituted.)
Gnephosis, Cassini in Bull. de la Soc. Philom. 45 (1820).
(Cephalosorus partly, Nematopus, Crossolepis, Leptotriche, Trichanthodium, Cyathopappus; some readily to be restituted.)
Decazesia, F. v. Mueller, Fragm. XI, 71 (1879).
Calocephalus, R. Brown in Transact. Linn. Soc. XII, 106 (1817).
(Lencophyta, Pachysurus, Blennospora, Achrysum.)
Cephalipterum, A. Gray in Hook. Kew Misc. IV, 271 (1852).
Gnaphalodes, A Gray in Hook. Kew Misc. IV, 228 (1852).
Craspedia, G. Forster, florul. insul. Austr. Prodr. 306 (1786).
(Richea, Pycnosorus.)
Chthonocephalus, Steetz in Lehm. Pl. Preiss. I, 444 (1845).
(Chamaesphaerion, Gyrostephium, Lachnothalamus.)
Podolepis, Labillardiere, Nov. Holl. pl. specim. II, 57, t. 28 (1806). (Scalia, Panaetia, Scaliopsis, Siemssenia, Stylolepis, Rutidcchlamys.)

Athrixia, Ker in Bot. Regist. VIII, 681 (1823).
(Asteridia, Chrysodiscus, Trichostegia).
Nablonium, Cassini, Dict. XXXIV, 101 (1825).
Chrysogonum, Linné, Hort. Cliffort. 424 (1737).
(Moonia, Pentalepis).
Siegesbeckia, Linné, Hort. Cliffort. 412 (1737)
Enhydra, Loureiro, Fl. Cochinch. II, 510 (1790).
(Enydra.)
Eclipta, Linné, Mantiss. II, 157 (1771).
Wedelia, Jacquin, Stirp. Amer. hist. 217, t. 130 (1763).
(Wollastonia.)
Spilanthes, Jacquin, Strip. Amer. hist. 214, t. 126 (1763).
Bidens, Dillenius, hort. Elth. 51 et 52, t. 43 and 44 (1732) from Cesalpini (1583). (Probably immigrated.)
Glossogyne, Cassini, Dict. LI, 475 (1827.)
(Diodontium.)
Flaveria, A. L. de Jussieu, Gen. 186 (1789).
Soliva, Ruiz et Pavon, Prodr. 113, t. 24 (1794).
(Gymnostyles) (Probably immigrated).
Cotula, Linné, syst. nat. 9 (1735); Linné, gen. 256 (1737).
(Gymnogyne, Strongylospermum, Pleiogyne, Symphyomera, Stenosperma, Leptinella.)
Centipeda, Loureiro, Fl. Cochinch. II, 492 (1790).
(Myriogyne, Sphaeromorphaea partly.)
Abrotanella, Cassini in Dict. XXXVI, 27 (1825).
(Scleroleima, Trineuron.)
Elachanthus, F. v. Mueller in Linnaea XXV, 410 (1852).
Ceratogyne, Turczaninow in Bull. Soc. Mosc. XXIV, 68 (1851).
(Diotosperma.)
Isoetopsis Turczaninow in Bull. Soc. Mosc. I, 175 (1851).
Gynura, Cassini in Dict. XXXIV, 391 (1825).
Senecio, Tournefort, Inst. 456, t. 260 (1700), from Plinius.
(Bedfordia, Centropappus.)
Erechtites, Rafinesque, Fl. Ludov. 65 (1817).
Cymbonotus, Cassini in Dict. XXXV, 397 (1825).
Saussurea, De Candolle in Ann. du Mus. XVI, 156 (1810).
(Aplotaxis, Haplotaxis.)
Centaurea, Linné, Hort. Cliffort 420 (1737).
(Leuzea.)
Trichocline, Cassini in Bull. Soc. Philom. 13 (1817).
(Amblysperma.)
Microseris, D. Don in Edin. Phil. Mag. XI, 388 (1832).
(Phyllopappus, Scorzonera partly.)
Crepis, Linné, gen. pl. 240 (1737).
(Youngia.)

CAMPANULACEÆ.

A. L. de Jussieu, Gen. 163 (1789) from B. de Jussieu (1759).

Lobelia, Linné, Fl. Lappon. 227 (1737).
(Rapuntium, Pratia, Grammatotheca, Holostigma.)
Isotoma, R. Brown, Prodr. I, 565 (1810).
(Lobelia partly, Enchysia partly, Laurentia partly.)
Wahlenbergia, Schrader, Catal. Hort. Bot. Goetting (1814).

CANDOLLEACEÆ.

F. v. Mueller, Fragmenta Phytographiæ Australiæ VIII, 41 (1873).

(Stylideæ, R. Brown, Prodr. I, 565 anno. 1810).
Candollea, Labillardière in Ann. du Mus. VI, 451 (1805).
(Ventenatia, Stylidium, Forsteropsis.)
Leeuwenhoekia, R. Brown, Prodr. 572 (1810).
(Levenhookia, Coleostylis.)
Phyllachne, R. et G. Forster, Char. Gen. 115, t. 58 (1776).
(Forstera, Oreostylidium, Helophyllum.)
Donatia, R. et G. Forster, Char. Gen. 9, t. 5 (1776).

GOODENIACEÆ.

R. Brown, Prodr. 573 (1810).

Brunonia, Smith in Transact. Linn. Soc. X, 366 (1810).
Dampiera, R. Brown, Prodr. 587 (1810).
(Linschotenia.)
Diaspasis, R. Brown, Prodr. 586 (1810).
Leschenaultia, R. Brown, Prodr. 581 (1810).
(Latourea.)
Anthotium, R. Brown, Prodr. 582 (1810).
Catosperma, Bentham in Hooker Icon. pl. t. 1028 (1868).
Scaevola, Linné, Mantiss. II, 145 (1771).
(Pogonetes, Temminckia, Camphusia, Crossotoma, Molkenboeria, Merkusia, Verreauxia.)
Selliera, Cavanilles, Anal. Cienz. Nat. I,41, t. 5 (1799).
Calogyne, R. Brown, Prodr. 579 (1810).
(Distylis.)
Goodenia, Smith in Transact. Linn. Soc. II, 347 (1794.)
(Goodenoughia, Picrophyta, Stekhovia, Aillya, Tetraphylax.)
Velleya, Smith in Transact. Linn. Soc. IV, 217 (1798).
(Velleia, Euthales.)

SYNPETALEÆ HYPOGYNÆ.

F. v. Mueller in Woolls's plants of the neighb. of Sydney, 34 (1880).

Gentianeæ.

Necker in Act. Acad. Theod. Pal. II, 477 (1770) from B. de Jussieu (1759).

Limnanthemum, Gmelin, Nov. Comm. Acad. Petrop. XIV, 527 (1770). (Villarsia, Liparophyllum.)
Sebaea, Solander in R. Brown, Prodr. 451 (1810).
Erythraea, Reneaulme, Specim. Hist. pl. 77, t. 76 (1611).
Canscora, Lamarck in Dict. I, 602 (1783).
(Orthostemon.)
Gentiana, Tournefort, Inst. 80, t. 40 (1700) from Dioscorides.

Loganiaceæ.

R. Brown in Flind. Voy. II, app. 564 (1814).

Strychnos, Linné Syst. Nat. 8 (1735); Linné, Sp. pl. I, 189 (1753).
Fagraea, Thunberg in Vet. Acad. Handl. 125 (1782).
Mitreola, Linné, Hort. Cliffort. 492 (1737).
Mitrasacme, Labillardière, Nov. Holl. pl. specim. I, 36, t. 49 (1804). (Mitragyne.)
Geniostoma, R. et G. Forster, Char. Gen. 23, t. 12 (1776).
Logania, R. Brown, Prodr. 454 (1810).
(Euosma 1808, bene restituenda.)

Plantagineæ.

A. L. de Jussieu, Gen. 89 (1789).

Plantago, Tournefort, Inst. 126, t. 48 (1700) from l'Ecluse (1576).

Primulaceæ.

Ventenat, Tabl. II, 285 (1799).

Anagallis, Tournefort, Inst. 142, t. 59 (1700) from Hippocrates and Dioscorides. (Centunculus, Micropyxis.)
Lysimachia, Tournefort, Inst. 141, t. 59 (1700) from Dioscorides.
Samolus, Tournefort, Inst. 143, t. 60 (1700). (Sheffieldia.)

Myrsinaceae.

(Primulacearum subordo.)

R. Brown, Prodr. 532 (1810).
Maesa, Forskael, Fl. Aegypt. Arab. 66 (1775).
(Baeobotrys.)
Samara, Linné, Mantiss. II, 144 (1771). (Choripetalum.)

Myrsine, Linné, Syst. Nat. 8 (1735); Linné, Gen. pl. 54 (1737).
Ardisia, Swartz, Prodr. 3 et 48 (1788).
Aegiceras, Gaertner, de Fruct. I, 216, t. 46 (1788).

Sapotaceae.

A. L. de Jussieu, Gen. 151 (1789) from B. de Jussieu (1759).

Chrysophyllum, Linné, Gen. pl. 361 (1737).
(Niemeyera.)
Lucuma, Molina, Saggia, 186 (1782).
(Sersalisia.)
Sideroxylon Dillenius, Hort. Eltham 357, t. 265 (1732).
(Achras, Sapota.)
Amorphospermum, F. v. Mueller, Fragm. VII, 112 (1870).
Hormogyne, A. de Candolle, Prodr. VIII, 176 (1844).
Madhuca, Hamilton in Asiat. Research. I, 300 (1788).
(Bassia, Illipe.)
Mimusops, Linné, Fl. Zeyl. 57 (1747).

Ebenaceae.

Ventenat, Tabl. II. 443 (1799).

Diospyros, Linné, Gen. pl. 143 (1737).
Maba, R. et G. Forster, Char. gen. 121, t. 61 (1776).
(Cargillia.)

Styraceae.

L. C. Richard, Analyse du fruit. 48 (1808).

Symplocos, N. J. Jacquin enum. plant. Carib. 24 (1760).

Jasmineae.

A. L. de Jussieu, Gen. 104 (1789) from Necker (1770).

Jasminum, Tournefort, Inst. 597. t. 368 (1700) from l'Ecluse (1611).
Olea, Tournefort, Inst. 598, t. 370 (1700) from Plinius.
Ligustrum, Tournefort, Inst. 596, t. 367 (1700) from C. Bauhin (1623).
Notelaea, Ventenat, Choix. t. 25 (1803).
Mayepea, Aublet, Hist. pl. Guian. I, 81, t. 31 (1775).
(Chionanthus partly, Linociera partly, Ceranthes.)

Apocyneae.

A. L. de Jussieu, Gen. 143 (1789).

Chilocarpus, Blume, Catal. hort. Buitenz. (1823).
Melodinus, R. et G. Forster, Char. Gen. 37, t. 19 (1776).
Carissa, Linné, Mantiss 7 (1767).
Cerbera, Linné, Gen. pl. 62 (1737).
Alyxia, Banks in R. Brown Prodr. 469 (1810).
(Gynopogon.)

Ochrosia, A. L. de Jussieu, Gen. pl. 143 (1789).
(Lactaria.)
Notonerium, Bentham in B. & J. H. Gen. II, 698 (1876).
Tabernaemontana, Plumier, Gen. 18, t. 30 (1703).
Vinca, Rivinus in Rupp. Fl. Jenens. 27 (1718) from Plinius.
(Perhaps immigrated.)
Alstonia, R. Brown in Mem. Wern. Soc. I, 75 (1809).
Ichnocarpus, R. Brown in Mem. Wern. Soc. I, 61 (1809).
Wrightia, R. Brown in Mem. Wern. Soc. I, 75 (1809).
(Balfouria.)
Parsonsia, R. Brown in Mem. Wern. Soc. I, 64 (1809).
Lyonsia, R. Brown in Mem. Wern. Soc. I, 66 (1809).

Asclepiadeae.

Jacquin, Misc. Austr. I, 35 (1778).

Gymnanthera, R. Brown in Mem. Wern. Soc. I, 58 (1809).
Secamone, R. Brown in Mem. Wern. Soc. I, 55 (1809).
Vincetoxicum, Dodonaeus, stirpium hist. pemptades, 704 (1583).
(Oxystelma partly, Cynoctonum.)
Cynanchum, Linné, Gen. pl. 63 (1737).
Sarcostemma, R. Brown in Mem. Wern. Soc. I, 50 (1809).
Daemia, R. Brown in Mem. Wern. Soc. I, 50 (1809).
(Pentatropis, Rhyncharrhena.)
Gymnema, R. Brown in Mem. Wern. Soc. I, 33 (1809).
(Bidaria.)
Gongronema, Decaisne in De Cand. Prodr. VIII, 624 (1844).
Tylophora, R. Brown in Mem. Wern. Soc. I, 28 (1809).
Marsdenia, R. Brown in Mem. Wern. Soc. I. 28 (1809).
(Leichhardtia.)
Thozetia, F. v. Mueller in Benth. Fl. Austr. IV, 347 (1869).
Hoya, R. Brown in Mem. Wern. Soc. I, 26 (1809).
Dischidia, R. Brown in Mem. Wern. Soc. I, 32 (1809).
Microstemma, R. Brown in Mem. Wern. Soc. I, 25 (1809).
Ceropegia, Linné, Gen. pl. 65 (1737).

Convolvulaceae.

A. L. de Jussieu, Gen. 132 (1789) from B. de Jussieu (1759).

Erycibe, Roxburgh, pl. Corom. III, 31, t. 159 (1798).
Lepistemon, Blume, Bijdr. 722 (1825).
Ipomoea, Linné, syst. nat. 8 (1735); Linné, Gen. pl. 47 (1737).
(Pharbitis, Batatas, Calonyction, Quamoclit, Aniseia.)
Convolvulus, Tournefort, Inst. 82, t. 17 (1700).
(Calystegia.)
Polymeria, R. Brown, Prodr. 488 (1810).
Porana, Burman, Fl. ind. 51, t. 21 (1768).
(Duperreya.)

Breweria, R. Brown, Prodr. 487 (1810).
Evolvulus, Linné, Sp. pl. ed. secund. 391 (1763).
Dichondra, R. et G. Forster, Char. gen. 39, t. 20 (1776).
Cressa, Linné, Amoen. acad. 1, 121 (1747).
Wilsonia, R. Brown, Prodr. 490 (1810).
Cuscuta, Tournefort, Inst. app. 652, t. 422 (1700) from C. Bauhin (1623).

Solanaceae.

Haller, Enum. stirp. Helv. Praef. 34 (1742).

Physalis, Linné, syst. nat. 8 (1735); Linné, Gen. pl. 51 (1737).
Solanum, Tournefort, Inst. 148, t. 62 (1700) from Celsus.
Lycium, Linné, Gen. pl. 57 (1737) from Celsus.
Datura, Linné, Gen. pl. 48 (1737).
Nicotiana, Tournefort, Inst. 117, t. 41 (1700), from C. Bauhin (1623).
Anthotroche, Endlicher, Nov. stirp. Mus. Vind. dec. 6 (1839).
Anthocercis, Labillardière, Nov. Holl. pl. spec. II, 19 (1806).
(Cyphanthera, Eadesia.)
Duboisia, R. Brown, Prodr. 448 (1810).

Scrophularinae.

Mirbel, Elém. II, 879 (1815).

Mimulus, Linné, Act. Soc. Upsal. 82 (1741).
(Uvedalia.)
Mazus, Loureiro, Fl. Cochinch. II, 385 (1790).
Adenosma, R. Brown, Prodr. 442 (1810).
(Pterostigma.)
Stemodia, Linné, Syst. ed. X, 1118 (1759).
(Morgania, Limnophila.)
Herpestis, K. F. Gaertner, de Fruct. III, 186, t. 214 (1805).
Gratiola, Ruppius, Fl. Jenens. 241 (1718) from Rivinus (1690).
Dopatrium, Hamilton in Benth. Scroph. rev. 4 (1835).
Artanema, D. Don in Sweet. fl. gard. t. 234 (1829).
Vandellia, Browne in Linné, Mantiss. 12 (1767).
(Ilysanthes, Bonnaya.)
Hemiarrhena, Bentham, Fl. Austr. IV, 518 (1869).
Peplidium, Delile, Fl. Aegypt. 148 (1813).
Microcarpaea, R. Brown, Prodr. 435 (1810).
Glossostigma, Arnott in Nov. Act. Leop. XVIII, 355 (1836).
(Tricholoma.)
Limosella, Lindern, opusc. plant. Argentorat. 156, t. 5 (1728).
Scoparia, Linné, syst. nat. edit. sext. 87 (1748).
Ourisia, Commerçon in A. L. de Juss. Gen. 100 (1789).
Veronica, Tournefort, Inst. 143, t. 60 (1700) from l'Ecluse (1583).
(Pygmaea.)

Ramphicarpa, Bentham in Hooker's Comp. Bot. Mag. I, 368 (1835).
Centranthera, R. Brown, Prodr. 438 (1810).
Sopubia, Hamilton in D. Don, Prodr. fl. Nepal. (1825).
Buechnera, Linné, Hort. Cliffort. 501 (1737).
(Buchnera, Striga.)
Euphrasia, Tournefort, Inst. 174, t. 78 (1700) from Camerarius (1586).

SELAGINEAE.

A. L. de Jussieu in Ann. du Mus. VII, 71 (1806).

Dischisma, Choisy, Mém. de la Soc. Genev. II, 93 (1823).
(Perhaps immigrated.)

OROBANCHEAE.

A. L. de Jussieu in Ann. du Mus. V, 25 (1804).

Orobanche, Tournefort, Inst. 175, t, 81 (1700) from l'Ecluse (1583). (Perhaps immigrated.)

LENTIBULARINAE.

L. C. Richard in Bulliard, Fl. Paris, ed. sec. I, 26 (1796).

Utricularia, Linné, syst. nat. 8 (1735); Linné, Gen. pl. 5 (1737).
Polypompholyx, Lehmann in der Bot. Zeit. Halle 109 (1844).
(Tetralobus.)

GESNERIACEAE.

Humboldt, Bonpland & Kunth, Nov. gen. II, 392 (1817).

Fieldia, Cunningham in Field's New South Wales 363, t. 2 (1825).
Negria, F. v. Mueller, Fragm. VII, 151 (1871).
(Rhabdothamnus partly.)
Baea, Commerçon in Lamarck, Dict. I, 401 (1783).
(Streptocarpus.)

BIGNONIACEAE.

Ventenat, Tabl. II, 402 (1799).

Tecoma, A. L. de Jussieu, Gen. 139 (1789).
Dolichandrone. Fenzl in Ann. nat. hist. X, 31 (1862).
(Spathodea partly, Dolichandra partly.)
Haussmannia, F. v. Mueller, Fragm. IV, 148 (1864).
Diplanthera, R. Brown, Prodr. 449 (1810).
(Deplanchea, Bulweria.)

ACANTHACEAE.

A. L. de Jussieu, Gen. 102 (1789), from B. de Jussieu (1759).

Thunbergia, Retzius, Physiogr. Saellsk. Handl. I, 163 (1776).
Nelsonia, R. Brown, Prodr. 480 (1810).
Ebermayera, Nees in Wallich. Pl. As. rar. III, 75 (1832).
Hygrophila, R. Brown, Prodr. 479 (1810).

Ruellia, Plumier, Nov. Gen. 12, t. 2 (1703).
(Dipteracanthus.)
Acanthus, Tournefort, Inst. 176, t. 81 (1700).
(Dilivaria) from Theophrastos.
Justicia, Houston in Linné, Gen. pl. 4 (1737).
(Rostellaria, Rostellularia.)
Graptophyllum, Nees in Wall. Pl. As. rar. III, 102 (1832).
(Earlia, Thyrsatanthus.)
Dicliptera, A. L. de Jussieu in Ann. du Mus. IX, 267 (1807).
(Brochosiphon.)
Hypoestes, Solander in R. Brown, Prodr. 474 (1810).
Eranthemum, Linné, Fl. Zeyl. 6 (1747).

HYDROPHYLLEAE.

R. Brown in Edw. Bot. Regist. t. 242 (1817).

Hydrolea, Linné, Sp. pl. ed. sec. 328 (1762).

ASPERIFOLIAE.

Haller, Enum. stirp. Helv. Praef. 34 (1742).

Cordia, Plumier, Gen. pl. 13, t. 14 (1703).
Ehretia, P. Browne, Civ. and nat. hist. of Jamaic. 168 t. 16 (1756).
Tournefortia, Linné, syt. nat. 8 (1735); Linné, Gen. pl. 55 (1737).
Coldenia, Linné, Amœn. acad. ed. prim. 119 (1747).
(Lobophyllum.)
Heliotropium, Tournefort, Inst. 138 t. 57 (1700). (Tiaridium, Heliophytum) from Theophrastos, Dioscorides and Plinius.
Halgania, Gaudichaud in Freyc. voy. Bot. 448 t. 59 (1826).
Pollichia, Medicus, Beobacht. 247 (1783).
(Trichodesma.)
Myosotis, Ruppius, Fl. Jenensis 9 (1718).
(Exarrhena.)
Eritrichum, Schrader in Commentat. Goett. IV, 186 (1820).
(Eritrichium.)
Lappula, Rivinus in Rupp., Fl. Jenensis 12 (1718).
(Echinospermum.)
Rochelia, Reichenbach in Fl. Regensb. bot. Zeit. I, 243 (1824).
(Maccoya.)
Cynoglossum, Tournefort, Inst. 139, t. 57 (1700) from Dioscorides.

LABIATAE.

Adanson, Fam. II, 180 (1763) from B. de Jessieu (1759).

Ocimum, Tournefort, Inst. 203, t. 96 (1700) from Theophrastos and Dioscorides.
Moschosma, Reichenbach, Consp. 115 (1828).
(Basilicum, 1802.)

Orthosiphon, Bentham, Labiat. 25 (1832).
Plectranthus, L'Héritier, Stirp. I, 85 (1785).
Coleus, Loureiro Fl. Cochinch. II, 372 (1790).
Pogostemon, Desfontaines in Mém. du Mus. II, 154, t. 6 (1815).
(Dysophylla.)
Mentha, Tournefort, Inst. 188, t. 89 (1700) from Hippocrates and Theophrastos.
Lycopus, Tournefort, Inst. 180, t. 83 (1700) from Plinius.
Salvia, Linnè, gen. 6 (1737) from Plinius.
Brunella, l'Ecluse rar. stirp. hist. II, 42–43 (1576) (Prunella).
Scutellaria, Hermann, Hort. Lugd. Bot. catal. (1687).
Anisomeles, R. Brown, Prodr. 503 (1810).
Leucas, J. Burman, thesaur. Zeyl. 140 (1737).
Depremesnilia, F. v. Mueller, Fragm. X, 59 (1876).
Prostanthera, Labillardière, Nov. Holl. pl. spec. 18, t. 157 (1806).
(Chilodia, Cryphia, Klanderia.)
Wrixonia, F. v. Mueller, Fragm. X, 18 (1876).
Hemigenia, R. Brown, Prodr. 502 (1810).
(Hemiandra, Colobandra, Atelandra.)
Microcorys, R. Brown, Prodr. 502 (1810). (Anisandra.)
Westringia, Smith in Vet. Acad. Handl. 171 (1797).
Teucrium, Tournefort, Inst. 207, t. 98 (1700) from Dioscorides.
Ajuga, Linné, Gen. pl. 167 (1737).

VERBENACEAE.

Adanson, Fam. II, 195 (1763) from B. de Jussieu (1757).

Lippia, Houston in Linnè, syst. nat. 8 (1735); Linné, Gen. pl. 347 (1737). (Zapania.)
Verbena, Tournefort, Inst. 200, t. 94 (1700) from l'Ecluse (1576).
Lachnostachys, Hooker, Icon. pl. t. 414 (1842).
(Walcottia, Pycnolachne.)
Newcastlia, F. v. Mueller in Hooker's Kew Miscell. IX, 22 (1857).
Physopsis, Turczaninow in Bull. de la Soc. Mosc. XXII, 34 (1849).
Mallophora, Endlicher in Ann. des Wien. Mus. II, 206 (1838).
(Lachnocephalus.)
Dicrastylis, Drummond and Harvey in Hooker's Kew Misc. VII, 157 (1855).
(Dicrastyles.)
Chloanthes, R. Brown, Prodr. 513 (1810).
(Pithyrodia, Quoya, Dasymalla.)
Hemiphora, F. v. Mueller, Fragm. IX. 13 (1876).
Denisonia, F. v. Mueller, Fragm. I, 124 (1859).

Cyanostegia, Turczaninow in Bull. Soc. nat. Mosc. XXII, 35 (1849). (Bunnya.)
Spartothamnus, Cunningham in Loudon's Hort. Brit. suppl. (1830).
Callicarpa, Linné in act. Soc. Upsal. 80 (1741).
Premna, Linné, Mantiss. II, 154 (1771).
Clerodendrum, Burman, thesaur. Zeylan. 66, t. 29 (1737).
(Clerodendron.)
Gmelina, Linné, Gen. ed. sec. 526 (1742).
Vitex, Tournefort, Inst. 603, t. 373 (1700) from Plinius.
Faradaya, F. v. Mueller, Fragm. V, 21 (1865).
Avicennia, Linné, syst. nat. 8 (1735); Linné, Gen. pl. 27 (1737).

MYOPORINAE.

R. Brown, Prodr. 514 (1810).

Myoporum, Banks & Solander in G. Forster, Prodr. 44 (1786).
(Bertolonia, Andrewsia, Pogonia, Disoon).
Eremophila, R. Brown, Prodr. 518 (1810).
(Pholidia, Stenochilus, Eremodendron, Pseudopholidia, Sentis, Duttonia, Pholidiopsis).

PEDALINEAE.

R. Brown, Prodr. 519 (1810).

Josephinia, Ventenat, Jard. de la Malmais. t. 103 (1804).

EPACRIDEAE.

R. Brown, Prodr. 535 (1810).

Styphelia, Solander in G. Forster, Fl. ins. austr. prodr. 13 (1786).
(Epacris, Forst. (1776) partly, Stiphelia, Ardisia, Astroloma, Cyathodes, Stenanthera, Leucopogon, Peroa, Perojoa, Melichrus, Acrotriche, Ventenatia, Monotoca, Soleniscia, Stomarrhena, Pentataphrus, Mesotriche, Phanerandra, Froebelia, Pentaptelion, Androstoma, Cyathopsis, Lissanthe partly.)
Conostephium, Bentham in Huegel. Enum. pl. Nov. Holl. austr. occ. 76 (1837). (Conostephiopsis.)
Coleanthera, Stschegleew in Bull. de la Soc. des. nat. de Mosc. 4 (1859). (Michiea.)
Trochocarpa, R. Brown, Prodr. 548 (1810).
(Decaspora, Pentachondra.)
Brachyloma, Sonder in Lehmann. Pl. Preiss. I, 304 (1845).
(Lobopogon, Lissanthe partly.)
Needhamia, R. Brown, Prodr. 549 (1810).
Oligarrhena, R. Brown, Prodr. 549 (1810).

Epacris, Cavanilles, Icon. IV, 25, t. 344 et 345 (1797). (Archeria.)
Woollsia, F. v. Mueller, Fragm. VIII, 52 (1872). (Lysinema partly.)
Lysinema, R. Brown, Prodr. 552 (1810).
Prionotes, R. Brown, Prodr. 552 (1810).
Cosmelia, R. Brown, Prodr. 553 (1810).
Ponceletia, R. Brown Prodr. 554 (1810).
Sprengelia, Smith in Vet. Acad. Handl. 260 (1794). (Poiretia.)
Andersonia, R. Brown, Prodr. 553 (1810). (Atherocephala, Homolostoma, Sphincterostoma.)
Richea, R. Brown, Prodr. 555 (1810). (Cystanthe, Pilitis.)
Dracophyllum, Labillardiere, Voy. II, 211, t. 40 (1798). (Epacris, Forst. 1776 partly.)
Sphenotoma, Sweet, Fl. Austral. t. 44 (1828).

Ericaceae.

A. L. de Jussieu, Gen. 159 (1789).

Pernettya, Gaudichaud in Ann. des. sc. nat. V, 102 (1825.)
Gaultiera, Kalm in Linné, nov. plant. gen. fig. 6 (1751). (Gaultheria.)
Wittsteinia, F. v. Mueller, Fragm. II, 136 (1861).

APETALEAE GYMNOSPERMEAE.

F. v. Mueller in Woolls's plants of the neighb. of Sydney, 40 (1880).

Coniferae.

Haller, En. stirp. Helv. I, 145 (1742).

Athrotaxis, D. Don in Transact. Linn. Soc. XVIII, 171 (1839). (Sequoia.)
Callitris, Ventenat, Dec. nov. gen. 10 (1808). (Frenela, Actinostrobus, Leichhardtia, Octolinis.)
Fitzroya, J. Hooker in Journ. hort. Soc. VI, 264 (1851). (Diselma.)
Pherosphaera, Archer in Hooker's Kew Misc. II, 52 (1850). (Dacrydium partly.)
Microcachrys, J. Hooker in Lond. Journ. of Bot. IV, 149 (1845). (Dacrydium partly.)
Dacrydium, Solander in G. Forster, Pl. escul. 80 (1786).
Thalamia, Syrengel, Anleit. zur. Kenntn. der Gew. II, 218, Zweit. Ausg. (1817). (Phyllocladus.)
Nageia, Gaertner, de Fructib. t. 39 (1788). (Podocarpus.)
Araucaria, A. L. de Jussieu, Gen. 413 (1789). (Colymbea, Eutassa.)
Dammara, Rumphius, Herb. Amboin. II, 174, t. 54 (1741 (Agathis.)

CYCADEAE.

L. C. Richard in Persoon. Synops. 630 (1807).

Cycas, Linné, Hort. Cliffort. 482 (1737).
Eucephalartos, Lehmann, Pugill. VI, 9, t. 1 et 3 (1834). (Macrozamia, Zamia partly, Arthrozamia, Lepidozamia, Catakidozamia.)
Bowenia, Hooker, Bot. Mag. t. 5398 (1863).

MONOCOTYLEDONEAE.

Ray, Method. Plant. emend. (1703).

CALYCEAE PERIGYNAE.

F. v. Mueller in Woolls's plants of the neighb. of Sydney, 41 (1880).

ORCHIDEAE.

Haller, Enum. Stirp. Helv. Praef. 33 (1742).

Sturmia, Reichenbach in Moessler's Handb. II, 1552 (1828). (Liparis, Richard (1818), not of Zoologists (1738).
Oberonia, Lindley, Gen. and sp. of Orchid. pl. 15 (1830). (Titania.)
Dendrobium, Swartz in Nov. Act. Upsal. VI, 82 (1799). (Thelychiton partly.)
Bulbophyllum, Petit-Thouars, Orchid. Afric. t. 95 et 108 (1822). (Bolbophyllum, Thelychiton partly.)
Phreatia, Lindley, Gen. and sp. of Orchid. pl. 63 (1830.) (Plexaure.)
Pholidota, Lindley in Hooker's exot. fl. t. 138 (1825).
Sarcochilus, R. Brown, Prodr. 332 (1810). (Thrixspermum, Gunnia, Cleisostoma.)
Taeniophyllum, Blume, Bijdr. 355 (1825).
Ornithochilus, Wallich in Lindley's Gen. and sp. Orchid. pl. 242 (1833). (Saccolabium partly.)
Geodorum, Jackson in Andrews Reposit. t. 626 (1810).
Eulophia, R. Brown in Edwards Bot. Regist. 686 (1822.) (Eulophus 1822.)
Dipodium, R. Brown, Prodr. 330 (1810).
Cymbidium, Swartz in Nov. Act. Upsal. VI, 70 (1799).
Spathoglottis, Blume, Bijdr. 400 (1825).
Phajus, Loureiro, Fl. Cochinch. II, 529 (1790).
Calanthe, R. Brown in Edwards Bot. Regist. 578 (1821).
Galeola, Loureiro, Fl. Cochinch. II, 520 (1790). (Erythrorchis, Ledgeria.)
Epipogum, Gmelin, Fl. Sibir. I, 11 t. 2 (1747).
Gastrodia, R. Brown, Prodr. 330 (1810).
Pogonia, A. L. de Jussieu, Gen. pl. 65 (1789).

Corymbis, Petit-Thouars, Orchid. Afric. t. 37 (1822). (Corymborchis.)
Etaeria, Blume, Bijdrag. 409 (1825). (Hetaeria, Ramphidia.)
Microstylis, Nuttall, Gen. Americ. II, 196 (1818).
Goodyera, R. Brown in Aiton's Hort. Kew sec. ed. V, 197 (1813).
Spiranthes, L. C. Richard in Mem. du Mus. IV, 40 (1818). (Gyrostachis, 1807.)
Thelymitra, R. et G. Forster, Char. gen. 97, t. 49 (1776). (Macdonaldia.)
Epiblema, R. Brown, Prodr. 315 (1810).
Diuris, Smith in Transact. Linn. Soc. IV, 222 (1798).
Orthoceras, R. Rrown, Prodr. 316 (1810).
Calochilus, R. Brown, Prodr. 320 (1810).
Cryptostylis, R. Brown, Prodr. 317 (1810). (Zosterostylis).
Prasophyllum, R. Brown, Prodr. 317 (1810). (Genoplesium.)
Microtis, R. Brown, Prodr. 320 (1810).
Corysanthes, R. Brown, Prodr. 328 (1810). (Nematoceras, Corybas.)
Pterostylis, R. Brown, Prodr. 326 (1810).
Sullivania, F. v. Mueller, inedited; characters of Cahya, except genoplesoid labellum.
Caleya, R. Brown in Aiton's Hort. Kew sec. ed. V, 204 (1813). (Caleana, 1810.)
Drakaea, Lindley, Bot. Regist. XXV, append. p. LV (1839). (Spiculaea, Arthrochilus.)
Acianthus, R. Brown, Prodr. 321 (1810).
Eriochilus, R. Brown, Prodr. 323 (1810).
Lyperanthus, R. Brown, Prodr. 325 (1810). (Burnettia.)
Cyrtostylis, R. Brown, Prodr. 322 (1810).
Caladenia, R. Brown, Prodr. 323 (1810). (Leptoceras, Adenochilus.)
Chiloglottis, R. Brown, Prodr. 322 (1810).
Glossodia, R. Brown, Prodr. 325 (1810).
Habenaria, Willdenow, Spec. plant. IV, 44 (1805).
Apostasia, Blume, Bijdr. 423 (1825). (Niemeyera.)

Scitamineae.

Linné, Phil. bot. 27 (1751).

Musa, Clusius, Exotic. libri decem 229 (1605).
Curcuma, Linné, Gen. pl. 332 (1737), from Hermann (1687).
Amomum, Linné, Gen. pl. 330 (1737).
Elettaria, White and Matton in Transact. Linn. Soc. X, 249 (1809), from Rheede (1692).
Alpinia, Linné, Gen. pl. 332 (1737). (Hellenia.)
Costus, C. Bauhin, Pinax 36 (1623).
Tapeinocheilos, Miquel in Ann. Mus. Lugd. IV, 101, t. 4 (1869).

Irideae.

Ventenat, Tabl. II, 188 (1799).

Diplarrhena, Labillardière, Voy. I, 275, t. 15 (1799).
Patersonia, R. Brown, Prodr. 303 (1810).
(Genosiris, 1804).
Iris, Tournefort, Inst. 358, t. 186-188 (1700) from Hippocrates, Theoprastos, Dioscorides and Plinius. (Moraea partly.)
Sisyrinchium, Linné, Gen. pl. 273 (1737).
(Libertia, Orthrosanthus, Renealmia, Nematostigma).
Campynema, Labillardière, Nov. Holl. pl. spec. I, 93, t. 121 (1804).

Burmanniaceae.

Sprengel, Syst. veg. I, 125 (1825).

Burmannia, Linné, syst. nat. 8 (1735); Linné, Gen. pl. 100 (1737).

Taccaceae.

Presl, Reliq. Haenk. I, 149 (1828).

Tacca, R. et G. Forster, Char. Gen. 65 (1776).

Dioscorideae.

Du Mortier, Analyse des fam. des pl. 57 (1829), from R. Brown (1810).
Dioscorea, Plumier, Gen. 9, t. 26 (1703). (Dioscoridea).
Petermannia, F. v. Mueller, Fragm. II, 92 (1860).

Hydrocharideae.

De Candolle, Flore Française, III, 265 (1825).

Hydrocharis, Linné, syst. nat. 8 (1735); Linné, Gen. pl. 308 (1737)
Enhalus, Cl. Richard in Mém de l'Inst. II, 64 (1811).
Halophila, Petit-Thouars, Gen. Madag. n. 6 (1809).
Ottelia, Persoon, Synops. pl. I, 400 (1805).
(Damasonium partly).
Blyxa, Noronha in Petit-Thouars, Gen. Madag. 14 (1809).
Vallisneria, Micheli, Nov. pl. Gen. 12, t. 10 (1729).
Hydrilla. Cl. Richard in Mém de l'Inst. II, 61 (1811).

Amaryllideae.

J. St. Hilaire, Expos. Fam. I, 134, t. 21 (1805).
Haemodorum, Smith in Transact. Linn. Soc. 213 (1798).
Phlebocarya, R. Brown, Prodr. 301 (1810).
Tribonanthes, Endlicher, Nov. Stirp. Dec. I, 27 (1839).
Conostylis, R. Brown, Prodr. 300 (1810).
(Blancoa, Androstemma.)
Anigozanthos, Labillardière, Voy. I, 411 (1798).
(Macropodia, Schwaegrichenia.)

Curculigo, Gaertner, de Fruct. I, 63, t. 16 (1788).
Hypoxis, Linné, Syst. ed. decim. 986 (1759).
Doryanthes, Correa in Transact. Linn. Soc. VI, 211 (1802).
Crinum, Linné, Gen. 97 (1737).
Eurycles, Salisbury in Transact. Hort. Soc. I, 337 (1812).
Calostemma, R. Brown, Prodr. 297 (1810).

CALYCEAE HYPOGYNAE.

F. v. Mueller in Woolls's plants of the neighb. of Sydney, 44 (1880).

LILIACEAE.

Haller, Enum. stirp. Helv. I, 279 (1742).

Smilax, Tournefort, Inst. 654, t. 421 (1700), from Theophrastos and Dioscorides.
Rhipogonum, R. et G. Forster Char. Gen. 49, t. 25 (1776).
Flagellaria, Linné, Amoen, Acad. 396 (1747).
Drymophila, R. Brown, Prodr. 292 (1810).
Dianella, Lamarck, Illustr. t. 250 (1786).
Asparagus, Tournefort, Inst. 300, t. 154 (1700).
(Asparagopsis), from Theophrastos, Dioscorides and Plinius.
Eustrephus, R. Brown, Prodr. 281 (1810).
Geitonoplesium, Cunningham in Bot. Mag. t. 3131 (1832).
(Luzuriago partly).
Dracaena, Vandelli, Diss. Drac. t. 1 (1762).
Cordyline, Commerçon in Hedwig, Gen. 243 (1806).
Blandfordia, Smith, Exot. bot. I, 5, t. 4 (1804).
Hewardia, Hooker, Icon. pl. 858 (1852).
Astelia, Banks & Solander in R. Brown, Prodr. 291 (1810).
(Hamelinia.)
Milligania. J. Hooker in Kew Misc. V, 296, pl. IX (1853).
Wurmbea, Thunberg, Nov. gen. I, 18 (1781).
(Anguillaria, Melanthium partly.)
Iphigenia, Kunth, Enum. pl. IV, 212 (1843).
Schelhammera, R. Brown, Prodr. 273 (1810).
Kreysigia, Reichenbach, Mittheilung. 68 (1829).
(Tripladenia.)
Burchardia, R. Brown, Prodr. 272 (1810).
Bulbine, Linné, Hort. Cliffort. 122 (1737).
(Chrysobactron, Anthericum partly.)
Agrostocrinum, F. v. Mueller, Fragm. II, 95 (1860.)
Thysanotus, R. Brown, Prodr. 282 (1810).
(Chlamyspermum.)
Hodgsoniola, F. v. Mueller, Fragm. II, 176 (1861).
(Hodgsonia.)
Caesia, R. Brown, Prodr. 277 (1810).
Chamaescilla, F. v. Mueller, Fragm. VII, 68 (1870). (Caesia partly.)

Corynotheca, F. v. Mueller, Fragm. VII, 68 (1870). (Caesia partly.)
Tricoryne, R. Brown, Prodr. 278 (1810).
Stypandra, R. Brown, Prodr. 278 (1810).
Arthropodium, R. Brown, Prodr. 276 (1810). (Dichopogon.)
Chlorophytum, Ker in Bot. Mag. t. 1071 (1808).
Herpolirion, J. Hooker, Fl. New Zeal. I, 258 (1853).
Sowerbaea, Smith in Transact. Lin. Soc. V, 159 (1800). (Sowerbya.)
Allania, Endlicher, Gen. 151 (1837). (Alania.)
Bartlingia, F. v. Mueller, Fragm. VII, 88 (1870.) (Laxmannia.)
Stawellia, F. v. Mueller, Fragm. VII, 85 (1870.)
Johnsonia, R. Brown, Prodr. 287 (1810).
Arnocrinum, Endlicher & Lehmann in Pl. Preiss. II, 41 (1846).
Borya, Labillardière, Nov. Holl. pl. spec. 81, t. 107 (1804).

Roxburghiaceae.

Lindley in Wallich, Pl. As. rar. III, 50 (1832).

Roxburghia, Jones in Roxburgh, Pl. Corom. I, 29, t. 32 (1795).

Pontederiaceae.

Humboldt, Bonpland & Kunth, Nov. gen. I, 265 (1815).

Monochoria, Presl, Reliq. Haenk. I, 127 (1827). (Limnostachys.)

Commelineae.

R. Brown, Prodr. 268 (1810).

Zygomenes, Salisbury in Transact. Hort. Soc. I, 271 (1812). (Cyanotis.)
Commelina, Plumier, Nov. gen. 48, t. 38 (1703). (Commelynia.)
Aneilema, R. Brown, Prodr. 270 (1810).
Floriscopa, Loureiro, Fl. Cochinch, I, 192 (1790). (Floscopa, Dithyrocarpus.)
Pollia, Thunberg, Nov. gen. I, 11 (1781).
Cartonema, R. Brown, Prodr. 271 (1810).

Philydreae.

R. Brown in App. to Flind. voy. II, 578 (1814).

Philydrum, Banks in Gaertner, de Fruct. I, 62 (1788). (Philhydrum.)
Pritzelia, F. v. Mueller, Papuan plants 13 (1875). (Hetaerla. Philydrella.)
Helmholtzia, F. v. Mueller, Fragm. V, 202 (1866).

Xyrideae.

Salisbury, in Transact. hort. Soc. I, 326 (1812).

Xyris, Linné, Gen. pl. 11 (1737).

Typhaceae.

A. L. de Jussieu, Gen. 25 (1789).

Typha, Tournefort, Inst. 530, t. 301 (1700), from Theophrastos, Dioscorides & Plinius.
Sparganium, Tournefort, Inst. 530, t. 302 (1700).

Aroideae.

A. L. de Jussieu, Gen. 23 (1789), from B. de Jussieu (1759).

Typhonium, Schott in Wien. Zeitschr. III, 72 (1829). (Arum partly.)
Amorphophallus, Blume in Nouv. Ann. du Mus. III, 366 (1834). (Brachyspatha.)
Colocasia, Ray, Method. 157 (1682). (Caladium partly.)
Rhaphidophora, Hasskarl in Fl. Regensb. Beibl. II, 11 (1842).
Gymnostachys, R. Brown, Prodr. 337 (1810).
Pothos, Linné, Amoen. acad. I, 410 (1747).

Lemnaceae.

J. E. Gray, Nat. arrang. of Brit. pl. II, 729 (1821).

Lemna, Linné, syst nat. 9 (1735); Linné, Fl. Lappon. 351 (1737). (Telmatophace, Spirodela.)
Wolffia, Horkel & Schleiden in Linnaea XIII, 389 (1839). (Wolfia.)

Alismaceae.

Ventenat, Tabl. II, 157 (1799).

Alisma, Rivinus in Ruppius, Fl. Jen. 54 (1718), from Dioscorides & Plinius.
Damasonium, Tournefort, Inst. 256 (1700). (Actinocarpus.)
Tenagocharis, Hochstetter in Fl. Regensb. 369 (1849). Butomopsis.)

Fluviales.

Ventenat, Tabl. II, 80 (1799).

Triglochin, Linné, Gen. pl. 106 (1737) from Rivinus (1718). (Cycnogeton.)
Aponogeton, Linné f., Suppl. 32 (1781).
Pomatogeton, Tournefort, Inst. 232, t. 103 (1700).
Ruppia, Linné, syst. nat. 9 (1735); Linné, Gen. pl. 277 (1737).
Posidonia, Koenig, Ann. of bot. II, 95, t. 6 (1806). (Caulinia partly.)
Zostera, Linné, Waesgoeta-Resa, 166–168 et fig. (1747).
Cymodocea, Koenig, Ann. of Bot. II, 96, t. 7(1806). (Amphibolis).

Lepilaena, Drummond & Harvey in Hooker's Kew. Misc. VII, 57 (1855). (Zannichellia partly, Hexatheca.)
Najas, Linné, syst. nat. 9 (1735); Linné, Gen. 278 (1737). (Caulinia partly.)

PANDANEAE.

R. Brown, Prodr. 340 (1810).

Pandanus, Rumphius, herb. Amboin. IV, 139, t. 74 (1750).
Freycinetia, Gaudichaud in Ann. Sc. Nat. III, 509 (1824).
Nipa, Wurmb in Verhandl. Batav. Genootsch. I, 349 (1779) from Camellus, Ray & Rumphius.

PALMAE.

Ray, Method. pl. emend. 135 (1703).

Calamus, Linné, Sp. pl. 325 (1753).
Bacularia, F. v. Mueller, Fragm. VII, 103 (1870). (Linospadix.)
Kentia, Blume in Bull. Neerl. 64 (1838).
(Grisebachia, Hydriastele, Hedyscepe, Kentiopsis.)
Clinostigma, Herm. Wendland in Seemann's Bonplandia X, 196 (1862). (Cyphokentia.)
Ptychosperma, Labillardière in Mem. de l'Inst, ann. 1808, I, 251, pl. X (1809).
(Seaforthia, Laccospadix, Archontophoenix).
Areca, Linné, Sp. pl. 1189 (1753) from Ray (1688).
Cocos, Linné, Sp. pl. 1188 (1753).
Caryota, Linné, Gen. pl. 355 (1737).
Licuala, Rumphius, herb. Amboin. I, 44, t. 9 (1741).
Livistona, R. Brown, Prodr. 267 (1810). (Corypha partly.)

JUNCEAE.

R. Brown, Prodr. fl. Nov. Holl. 257 (1810).

Lomandra, Labillardière, Nov. Holl. pl. specim. I, 92 (1804). (Xerotes.)
Acanthocarpus, Lehmann, Pl. Preiss. II, 274 (1847). (Chamaexeros.)
Xanthorrhoea, Smith in Transact. Linn. Soc. IV, 219 (1798).
Dasypogon, R. Brown, Prodr. 263 (1810).
Kingia, R. Brown in App. King's voy. bot. 529 (1826).
Baxteria, R. Brown in Hooker's Lond. Journ. Bot. II, 492, t. XIII, XIV, XV (1843).
Calectasia, R. Brown, Prodr. 263 (1810).
Luzula, De Candolle, Fl. franc. III, 158 (1805).
Juncus, Tournefort, Inst. 246, t. 127 (1700) from Camerarius, J. & C. Bauhin, Ray & Morison.

Eriocauleae.

Humboldt, Bonpland & Kunth, Nov. Gen. I, 251 (1815).

Eriocaulon, Linné, Gen. pl. ed. sec. 35 (1742). (Electrosperma.)

Restiaceae.

R. Brown, Prodr. 243 (1810).

Trithuria, J. Hooker, Fl. Tasman. II, 79, t. 138 (1860).
(Juncella, 1854.)
Aphelia, R. Brown, Prodr. 251 (1810). (Brizula.)
Centrolepis, Labillardière, Nov. Holl. pl. spec. I, 7 (1804).
(Desvauxia, Alepyrum.)
Lyginia, R. Brown, Prodr. I, 248 (1810).
(Schoenodum partly.)
Ecdeiocolea, F. v. Mueller, Fragm. VIII, 236 (1874).
Anarthria, R. Brown, Prodr. 248 (1810).
Lepyrodia, R. Brown, Prodr. 247 (1810).
Restio, Linné, Syst. edit. XII, 735 (1766). (Megalotheca.)
Loxocarya, R. Brown, Prodr. 249 (1810).
Calostrophus, Labillardière, Nov. Holl. pl. spec. II, 78 (1806).
(Calorophus, Hypolaena, Desmocladus.)
Leptocarpus, R. Brown, Prodr. 250 (1810).
(Schoenodum partly.)
Lepidobolus, Nees in Lehmann, Pl. Preiss. II, 66 (1846).
Chaetanthus, R. Brown, Prodr. 251 (1810).
(Prionosepalum.)
Onychosepalum, Steudel, syn. pl. glum. II, 249 (1855).

ACALYCEAE HYPOGYNAE.

F. v. Mueller in Woolls's plants of the neighb. of Sydney, 48 (1880).

Cyperaceae.

Haller, Enum. stirp. Helvet. I, 234 (1742).

Kyllingia, Rottboell, descr. et. icon. t. 4 (1773).
(Kyllinga.)
Cyperus, Tournefort, Inst. 527, t. 299 (1700) from Hippocrates, Theophrastos and Plinius.
(Pycreus, Mariscus Anosporum.)
Heleocharis, R. Brown, Prodr. 224 (1810).
(Eleocharis, Eleochiton, Scirpidium.)
Fimbristylis, Vahl Enum. II 285 (1806).
(Abildgaardia, Trichelostylis, Oncostyles.)

Scirpus, Tournefort, Inst. 528, t. 300 (1700).
(Isolepis, Malacochaete.)
Lipocarpha, Nees in Linnaea IX, 287 (1834).
(Hypaelyptum.)
Fuirena, Rottboell, Descr. et icon. rar. pl. illustr. 70 (1773.)
Hypelytrum, L. Cl. Richard in Persoon, Synops. I, 70 (1805).
(Hypolytrum.)
Exocarya, Bentham in Hooker, Icon. Pl. t. 1025 (1877).
Mapania, Aublet, Hist. Pl. Guian. 47, t. 17 (1775).
(Pandanophyllum.)
Scirpodendron, Zippelius in Journ. Asiat. Soc. Beng. XXXVIII, 85 (1869).
Lepironia, L. Cl. Richard in Persoon, Synops. I, 70 (1805).
(Chondrachne.)
Chorizandra, R. Brown, Prodr. 221 (1810).
(Chorisandra.)
Oreobolus, R. Brown, Prodr. 235 (1810).
Remirea, Aublet, Hist. pl. Guian. I, 44, t. 16 (1775).
Rhynchospora, Vahl, Enum. II, 229 (1806).
Cyathochaete, Nees in Lehmann. Pl. Preiss. II, 86 (1846).
(Tetralepsis.)
Schoenus, Linné, Coroll. Gen. 2 (1737).
(Chaetospora, Carpha, Elynanthus, Tricostularia, Helothrix, Isoschoenus, Gymnochaete, Gymnoschoenus, Mesomelaena, Discopodium.)
Lepidosperma, Labillardière, Nov. Holl. pl. spec. I, 14 (1804).
Cladium, P. Browne, Civ. and nat. hist. of Jamaic. 114 (1756).
(Gahnia, Baumea, Chapelliera, Morelotia, Lampocarya).
Caustis, R. Brown, Prodr. 239 (1810). (Eurostorrhiza.)
Arthrostylis, R. Brown, Prodr. 229 (1810). (Arthrostyles.)
Reedia, F. v. Mueller, Fragm. I, 240, t. 10 (1859).
Euandra, R. Brown, Prodr. 239 (1810). (Evandra.)
Scleria, Bergius in Vet. Ac. Handl. 149, t. 4 (1765).
(Diplacrum, Sphaeropus.)
Uncinia, Persoon, Synops. I, 534 (1807).
Carex, Ruppius, Fl. Jenens. 306 (1718).

Gramineæ.

Haller, Enum. stirp. Helvet. I, 203 (1742).

Leersia, Solander in Swartz, nov. gen. et spec. 1 et 21 (1788).
(Asprella Asperella.)
Oryza, Tournefort, Inst., 513, t. 296 (1700), from Theophrastos and Dioscorides.
Potamophila, R. Brown, Prodr. 211 (1810).
Ehrharta, Thunberg in Vetensk. Acad. Handl. 216, t. 8 (1779).
(Tetrarrhena, Microlaena, Diplax.)

Leptaspis, R. Brown, Prodr. 211 (1810).
Hierochloe, J. G. Gmelin, Fl. Sibiric. I, 100 (1747).
(Hierochloa, Linné, syst. nat. 8 (1735). (Disarrhenum.)
Alopecurus, Linné, Gen. pl. 18 (1737).
(Perhaps immigrated.)
Arundinella, Raddi, Agrostograph. Brasil. 37 (1823).
Eriochloa, Humboldt, Bonpland & Kunth, Nov. gen. et sp. pl. I, 94, t. 30 (1815). (Helopus.)
Paspalum, Linné, Syst. ed. decim. 855 (1759).
Panicum, Tournefort, Inst. 515, t. 298 (1700).
(Chamaeraphis, Oplismenus, Digitaria, Echinochloa, Coridochloa, Orthopogon, Isachne.)
Setaria, Palisot, Agrost. 51, t. 13 (1812).
Pennisetum, Cl. Richard in Persoon, Synops. I, 72 (1805).
(Plagiosetum, Gymnothrix.)
Cenchrus, Linné, Coroll. 20 (1737).
Tragus, Haller, Hist. strip. Helv. n. 1413 (1768). (Lappago.)
Xerochloa, R. Brown, Prodr. 196 (1810).
Thuarea, Persoon, Syn. I, 110 (1810). (Thouarsea.)
Spinifex, Linné, Mantiss. II, 163 (1771).
Neurachne, R. Brown, Prodr. 196 (1810).
Pentapogon, R. Brown, Prodr. 173 (1810).
Diplachne, Endlicher, Prodr. fl. Norfolk. 20 (1833).
Stipa, Linné, Sp. pl. 78 (1753). (Streptachne.)
Aristida, Linné, Sp. pl. 82 (1753).
Cinna, Linné, Sp. pl. 5 (1753). (Echinopogon.)
Sporobolus, R. Brown, Prodr. 169 (1810). (Vilfa.)
Agrostis, Linné, syst. nat. 8 (1735); Linné, Gen. pl. 19 (1737). (Deyeuxia, Didymochaeta, Bromidium.)
Perotis, Aiton, Hort. Kew I, 85 (1789).
Polypogon, Desfontaines, Fl. Atlant. I, 66 (1800).
Arundo, Tournefort, Inst. 526 (1700).
(Phragmites), from C. Bauhin (1623).
Diplopogon, R. Brown, Prodr. 176 (1810). (Dipogonia.)
Amphipogon, R. Brown, Prodr. 175 (1810).
(Aegopogon partly, Gamelythrum.)
Pappophorum, Schreber, Gen. II, 787 (1791).
Trirhaphis, R. Brown, Prodr. 185 (1810). (Triraphis.)
Ectrosia, R. Brown, Prodr. 185 (1810).
Elytrophorus, Palisot, Agrost. 67, t. 14 (1812).
Heterachne, Bentham, Fl. Austr. VII, 634 (1878).
Micraira, F. v. Mueller, Fragm. V, 208 (1866).
Coelachne, R. Brown, Prodr. 187 (1810).
Eragrostis, Palisot, Agrost. 70, t. 14 (1812). (Poa partly.)
Poa, Linné Gen. pl. 20 (1737). (Glyceria, Schenodorus.)
Centotheca, Desvaux in Palisot, Agrost. 69. t. 14 (1812).

Distichlis, Rafinesque in Journ. de Phys. I, XXXIX, 104 (1819).
Triodia, R. Brown, Prodr. 182 (1810).
Diplachne, Palisot, Agrost. 9, t. 16 (1812).
Festuca, Dillenius, Nov. gen. 90, t. 3 (1719).
Bromus, Dillenius in Linné, syst. nat. 8 (1735); Linné, Gen. pl. 15 (1737).
Agropyron, J. Gaertner, Nov. comm. Petrop. XIV, 539 (1770).
(Agropyrum, Triticum partly, Vulpia.)
Bambusa, Schreber, Gen. pl. I, 236 (1789).
Eleusine, J. Gaertner, de Fruct. I, 7, t. 1, f. 11 (1788).
(Leptochloa, Dactyloctenium.)
Cynodon, Cl. Richard in Persoon, Synops. I, 85 (1805).
Chloris, Swartz, Nov. Gen. et sp. pl. 25 (1788).
Microchloa, R. Brown, Prodr. 208 (1810).
Aira, Linné, Gen. pl. 335 (1737). (Deschampsia.)
Trisetum, Persoon, Syn. pl. I, 97 (1805).
Anisopogon, R. Brown, Prodr. 176 (1810).
Eriachne, R. Brown, Prodr. 183 (1810).
Danthonia, De Candolle, Fl. franç. III, 32 (1805).
(Amphibromus.)
Astrebla, F. v. Mueller in Bentham's Fl. Austr. VII, 602 (1878).
Lepturus, R. Brown, Prodr. 207 (1810).
Ophiuros, K. F. Gaertner, de fruct. III, 3, t. 181 (1805).
(Ophiurus.)
Hemarthria, R. Brown, Prodr. 207 (1810).
Rottboellia, Linné f., Gram. gen. 22 (1779).
Manisuris, Linné, Mantiss. II, 164 (1771).
Chionachne, R. Brown in Horsfield's pl. Jav. rar. 15 (1838).
Zoysia, Willdenow, Neue Schrift. nat. Freunde zu Berl. III, 440 (1801).
Dimeria, R. Brown, Prodr. 204 (1810).
Imperata, Cyrillo, Pl. rar. Neap. II, t. 11 (1792).
Erianthus, Richard in Michaux, Fl. bor. Amer. I, 54 (1803).
(Saccharum partly, Pollinia, Pogonatherum.)
Elionurus, Willdenow, Spec. pl. IV, 941 (1805).
Anthistiria, Linné f., Gram. gen. 35 (1779).
(Iseilema.)
Andropogon, Royen, Prodr. exhib. pl. hort. ac. Ludg. 52 (1740).
(Hetropogon, Ischaemum, Chrysopogon, Spodiopogon, Holcus partly, Sorghum, Hologamium, Arthraxon, Batratherum.)
Apluda, Linné, Sp. pl. 82 (1753).

ACOTYLEDONEAE.

A. L. de Jussieu, genera plantarum 1 (1789).

CHARACEAE.

L. C. Richard in Humboldt, Bonpland & Kunth, Nov. gen. Amer. I, 45 (1815).

Chara, Vaillant in Act. acad. Paris 17 & 23, t. 3 (1719); from Ray (1670).
Nitella, Agardh, Syst. Alg. XXIV (1824).

FILIVALOS.

Berkeley, cryptogamic Botany, 424 (1857).

Rhizospermae.

Weber, Primit. fl. Holsat. 74 (1780).

Azolla, Lamarck, Dict. encycl. I, 343 (1783).
Marsilea, Linné, Gen. pl. 326 (1737). (Marsiglia.)
Pilularia, Vaillant, Bot. Paris 159, t. 15 (1727).
Isoetes, Linné, Skanska Resa, 420 (1751).

Lycopodineae.

Swartz, Synops, filic, XV (1806).

Psilotum, Swartz in Schrader's Journ. II, 109 (1800).
Tmesipteris, Bernhardi in Schrader's Journ. II, 131 (1800).
Lycopodium, Ruppius, Fl. jen. 32 (1718).
Selaginella, Palisot, Prodr. Aétheog. 101 (1805).
(Lycopodium partly.)
Phylloglossum, Kunze in der Bot. Zeitung 721 (1843).

Filices.

Linné, Gen. pl. 322 (1737).

Ophioglossum, Tournefort, Inst. 548, t. 325 (1700).
(Ophioderma.)
Botrychium, Swartz in Schrader's Journ. II, 110 (1800).
Helminthostachys, Kaulfuss, Enum. Fil. 28 (1824).
Lygodium, Swartz in Schrader's Journ. III, 7 & 106 (1800).
(Hydroglossum, Lygodictyon.)
Schizaea, Smith in Mem. Acad. Turin. V. 149, t. 19 (1791).
(Lopidium, Actinostachys.)
Angiopteris, Hoffmann in Comment. Goett. XII, 29 (1796).
Marattia, Swartz, Nov. gen. et sp. pl. 8 & 128 (1788).
Ceratopteris, Brongniart in Bull. de la soc. philom. 186 (1821).
(Parkeria.)
Gleichenia, Smith in Mem. Acad. Turin. V, 418 (1791).
(Platyzoma, Stromatopteris, Mertensia.)
Osmunda, Tournefort, Inst. 547, t. 324 (1700). (Todea, Leptopteris.)

Trichomanes, Linné, Hort. Cliffort. 476 (1737).
Hymenophyllum, Smith in Roemer's Archiv. I, 56 (1797).
Cyathea, Smith in Mem. Acad. Turin. V, 416 (1791).
(Hemitelia, Amphicosmia.)
Alsophila, R. Brown, Prodr. 158 (1810).
Dicksonia, L'Héritier, Sert. angl. 31 (1788).
(Cibotium, Patania, Dennstaedtia, Deparia, Balantium partly.)
Davallia, Smith in Mem. Acad. Turin. V, 414 (1791).
(Microlepia, Humata, Balantium partly.)
Vittaria, Smith in Mem. Acad. Turin. V, 414 (1791).
Lindsaya, Dryander in Mem. Acad. Turin. V, 413 (1791).
(Lindsaea, Isoloma, Synophlebium, Schizoloma.)
Adiantum, Tournefort, Inst. 543, t. 317 (1700), from Hippocrates, Theophrastos, Dioscorides and Plinius.
Cheilanthes, Swartz, Syn. Fil. 126, t. 3 (1806).
(Notholaena, Nothochlaena.)
Pteris, Linné, syst. nat. 9 (1735); Linné, Gen. pl. 322 (1737).
(Pellaea, Cheiloplecton, Platyloma, Litobrochia.)
Lomaria, Willdenow in Berl. Mag. III, 160 (1809).
(Stegania, Plagiogyria.)
Blechnum, Linné, Sp. pl. II, 1077 (1753).
Monogramma, Commerçon in Schkuhr's Kryptog. Gew. 82, t. 87 (1809). (Monogramme.)
Woodwardia, Smith in Act. Acad. Turin. V, 411 (1791). (Doodia.)
Asplenium, Linné, Gen. pl. 322 (1737), from J. Bauhin, 1651.
(Scolopendrium, Allantodea, Diplazium, Callipteris, Anisogonium, Thamnopteris, Neottopteris, Darea, Coenopteris, Athyrium, Diplora.)
Cystopteris, Bernhardi in Schrader's neuem Journ. I, 26 (1806).
Aspidium, Swartz in Schrader's Journ. II, 429 (1800).
(Nephrodium, Nephrolepis, Polystichum, Lastraea, Sagenia, Oleandra.)
Polypodium, Tournefort, Inst. 540, t. 316 (1700); from Theophrastos Dioscorides and Plinius.
(Niphobolus, Goniophlebium, Goniopteris, Phlebodium, Phegopteris, Phymatodes, Pleopeltis, Drynaria, Dictyopteris, Arthropteris, Xiphopteris, Meniscium partly; from Dodoens, de l'Ecluse, Bauhin, Morison, Ray, Plumier and particularly Petiver as Polypodium.)
Hypolepis, Bernhardi in Schrader's neuem Journ. II, 24 (1806).
Grammitis, Swartz in Schrader's Journ. II, 3 & 17 (1800).
(Gymnogramme, Selliguea.)
Antrophyum, Kaulfuss, Enum. filic. 197 (1824).
Acrostichum, Linné, Gen. pl. 322 (1737)—indicative.
(Elaphoglossum, Stenochlaena, Lomariopsis, Hymenolepis, Gymnopteris, Chrysodium.)
Platycerium, Desvaux in Mem. soc. Linn. Par. VI, 213 (1827).

MUSCI.

Linné, Gen. pl. 323 (1737).

HYPOPHYLLOCARPAE.

Bridel, Bryologia universa I, p. XLVI (1826).

Cyathophorum, Palisot, Prodr. Aethéog. 33 et 52 (1805).
Catharomnion, J. Hooker & Wilson in Fl. N. Zeal. II, 119 (1855
Lopidium, J. Hooker & Wilson in Fl. N. Zeal. II, 119 (1855).
Hypopterygium, Bridel, Bryol. univers. I, XLVI (1826).
Powellia, Mitten in the Journal of the Linn. Soc. X, 187 (1868).
Rhacopilum, Palisot, Prodr. Aethéog. 36 et 87 (1805).
(Racopilum.)

FISSIDENTEAE.

Bruch, Schimper et Guembel, Bryol. Europ. fasc. XVII (1843).

Conomitrium, Montagne in Ann. des sc. nat. sec. sér. VIII, 245 (1837).
Fissidens, Hedwig, Fundam. II, 91 (1782).

HYPNACEAE.

Bruch, Schimper et Guembel, Bryol. Europ. V–VI (1855).

Glossophyllum, C. Mueller, Synops. muscor. II, 229 (1851).
(Stereophyllum.)
Microthamnium, Mitten in the Journ. of the Linn. Soc. XII, 503 (1869).
Isopterygium, Mitten in the journ. of the Linn. Soc. XII, 21 (1869).
Eurhynchium, Bruch, Schimper & Guembel, Bryol. Europ. fasc. 57 (1853).
Acrocladium, Mitten in the Journ. of the Linn. Soc. XII, 503 (1869).
Plagiothecium, Bruch, Schimper & Guembel, Bryol. Europ. fasc. 48 (1852).
Amblystegium, Bruch, Schimper & Guembel, Bryol. Europ. fasc. 56 (1853).
Hypnum, Dillenius, Nov. gen. 85, t. 1 (1719).
(Hypnon, Isothecium partly, Limnobium.)
Mniodendron, Lindberg in Oefvers of kongl. Vetensk Acad. Fœrhandl XVIII, 375 (1861).
Brachythecium, Bruch, Schimper & Guembel, Bryol. Europ. fasc. 53 (1853).
Thamniella, Béscherelle in Ann. des Sc. nat. cinq. sér. XVIII, 239 (1873).
Rhaphidostegium, Bruch, Schimper & Guembel, Bryol. Europ fasc. 51 (1852). (Rhynchostegium partly.)
Rhynchostegium, Bruch, Schimper & Guembel, Bryol. Europ fasc. 51 (1852).

Daltoniaceae.

Bruch, Schimper et Guembel, Bryol. Europ. fasc. XLIV & XLV (1855).

Daltonia, Hooker & Taylor, musc. Brit. 80 (1818).

Hookeriaceae.

C. Mueller in der Linnaea XXI, 190 (1848).

Pterygophyllum, Bridel, Bryol. Univ. II, 341 (1827).
Hookeria, Smith in the transact. of the Linn. Soc. IX, 275, t. 23 (1808).
Distichophyllum, Dozy & Molkenboer, Musc. frond. archip. Ind. t. 33–35 (1846.) (Mniadelphus).
Eriopus, Bridel, Bryol Univ. II, 339 (1827).

Leskeaceae.

Bruch, Schimper & Guembel, Bryol. Europ. V (1852).

Thuidium, Bruch, Schimper & Guembel, Bryol. Europ. fasc. 45 (1852).
Leskea, Hedwig, Fund. hist. musc. II, 92 (1782).
(Leskia.)
Braithwaitea, Lindberg in Act. Soc. sc. Fennic. X, 250 (1870).
(Dendro-Leskea partly, Isothecium partly.)

Trachylomaceae.

(Pseudo-Neckeraceae, Hampe.)

Entodon, C. Mueller in Mohl & Sclechtendal's Bot. Zeitung, 740 (1844).
Trachyloma, Bridel, Bryolog. Univ. I, pag. XLVI (1826).
Lepyrodon, Hampe in annal. des Sc. nat. cing. sér. IV, 337 (1866).
(Leucodon partly.)

Fabroniaceae.

Hampe in Lehmann, Pl. Preiss. II, 118 (1846).

Fabronia, Raddi, Atti Acad. Sien. IX, 230 (1811).

Leucodonteae.

Hampe in der Linnaea XX, 90 (1847).

Trichomitrium, Reichenbach, Consp. 32 (1828).
(Lasia.)
Ptychothecium, Hampe in F. v. M. fragm. phytogr. Austr. XI, suppl. 50 (1880).
(Leskea partly.)
Endotrichum, Dozy et Molkenboer in Ann. des Sc. nat. trois. sér. II, 303 (1844).

Garovaglia, Endlicher, Gen. pl. 57 et 1451 (1836).
(Endotrichella.)
Euptychium, Schimper in Nov. Act. Acad. Caes. Leop. Corol. XXXII, 4 (1866).

NECKERACEAE.

C. Mueller in Mohl & Schlechtendal's Bot. Zeitung 767 (1848).

Cryptogonium, Lindberg in Oefers. af Kongl. Vetensk. Akad. Foerhandl. 603 (1873). (Phyllogonium partly.)
Climacium, Weber & Mohr, Taschenbuch, 225 (1804).
Neckera, Hedwig, Fund. hist. musc. II, 93 (1782).
(non Neckeria, Scopoli. 1777.)
Homalia, Bridel, Bryalog. Univ. II, 325 (1827).
(Omalia.)
Papillaria, C. Mueller Synops. musc. II, 134 (1851).
(Trachypus partly.)
Pilotrichella, C. Mueller, Synops musc. II, 129 (1851).
(Trachypus partly, Neckera partly.)
Meteorium, Bridel, Bryol. Univ. II, 244 (1827).
Camptochaete, Reichardt in der Reise der Novara, Bot. Theil, 190 (1870).
Thamnium, Bruch, Schimper et Guembel, Bryol. Europ. fasc. 48 (1852). (Flabellaria.)

CYRTOPODEAE.

Jalger and Sauerbech in den Verh. den St. Gall., Naturf. Gesellsd. II, 131 (1875).
Cyrtopus, Bridel, Bryol Univ. II, 235 (1827).

BESCHERELLACEAE.

(Acrophyllaceae, Hampe).

Spiridens, Nees in Nov. Act. Acad. Caes. Leop. Carol. XI, 141 t. 17 (1823).
Bescherellea, Duby in Bull. de la Soc. bot. de France 130 t. XX (1867).
Cladomnion, J. Hooker & Wilson in Fl. N. Zeal. II., 99 (1855).

CRYPHAEACEAE.

Hampe in der Linnaea, XX, 82 (1847).

Hedwigia Ehrhart in Hanov. Magaz. 69, 1095 (1781).
Cryphaea, Bridel, Meth. musc. 139 (1822).
Dendropogon, Schimper in der Bot. Zeitung 377 (1843).
Harrisona, Adanson, Familles des pl. II, 491 (1763).
Hedwigidium, Bruch, Schimper et Guembel, Bryol, Europ. fasc. 29 et 30 (1846). (Schistidium partly.)

Herpodiaceae.

C. Mueller in der Bot. Zeitung 775 (1843).

Herpodium, Bridel, Bryol Univ. I, pag. XLVI (1826).
(Erpodium).
Goniomitrium, J. Hooker & Wilson in Lond. journ. of Bot. V, 142 t. 3 (1846).
Leptangium, Montagne in C. Mueller, Synops. muscor. II, 185 (1851).

Polytrichaceae.

Hampe in der Linnaea XIII, 44 (1839).

Dawsonia, R. Brown in Transact. Linn. Soc. X, 316 (1811).
Psilopilum, Bridel, Bryol. Univ. II, 95 (1827).
Catharinea, Ehrhart in Hannov. Mag. 933 (1780).
(Atrichum).
Polytrichadelphus, C. Mueller, synops. musc. I, 301 (1849).
Polytrichum, Dillenius, Nov. pl. gen. 85 (1719), from C. Bauhin (1623).
Pogonatum, Palisot, prodr. aethéog. 39 (1805).

Buxbaumiaceae.

Greville & Arnott in Mem. of the Werner Soc. V, 72 (1824).
Buxbaumia, Haller, Enum. stirp. Helvet. I, 10 (1742).

Rhizogonieae.

C. Mueller in der Bot. Zeitung 802 (1847).

Hymenodon, J. Hooker & Wilson in Lond. journ. of Bot. III, 548 (1844).
Rhizogonium, Bridel, Bryolog. Univ. I, page XLVI (1826).
Mniopsis, Mitten in the proceed. of the Linn. Soc. IV, 94 (1860).
Leptobryum, Bruch, Schimper & Guembel, Bryol. Europ. fasc. 46 and 47 (1851).

Mniaceae.

C. Mueller, Syn. Musc. I, 152 (1848).

Mnium, Dillenius, hist. musc. 230 t. 31, f. 1 (1741).
Leptotheca, Schwaegrichen, Suppl. sec. I, 135 t. 137 (1824).
Leptostomum, R. Brown in Transact. Linn. Soc. X, 320 (1811).
Aulacomnium, Schwaegrichen, spec. musc. suppl. tert. t. 215 (1827).

Bryaceae.

Bridel, Bryolog. Univ. II, pag. XLIV (1827).

Orthodontium, Schwaegrichen, sp. musc. suppl. sec. II, 123, t. 188 (1827).
Mielichhoferia, Hornschuch in Nees & Hornsch Bryol. Germ. II, 179 (1831).

Brachymenium, Schwaegrichen, Suppl. sec. I, 131 t. 135 (1824).
Bryum, Dillenius, hist. musc. 392, 396, 398, 400, t. 50, fig. 62, 66, 67, 69 (1741).
(Bryon Doliolidium).
Webera, Hedwig, fundam. muscor. II, 95 (1782).

ORTHOTRICHACEAE.

Bridel, Bryolog, Univ, II, XLIII (1827).

Zygodon, Hooker & Taylor, Musc. Brit. 70 (1818).
Codonoblepharum, Bridel, Bryol. Univ. I, 746 (1826).
Orthotrichum, Hedwig, Descr. musc. frond. II, 96 (1789).
Ulota, Mohr in F. Weber, tabul. musc. gener. (1813).
Macromitrium, Bridel, Meth, musc. 132 (1822).
Schlotheimia, Bridel, Muscolog. recentior. suppl. pars II, 16 (1812).

PTYCHOMITRIACEAE.

Bruch, Schimper & Guembel, Bryol. Europ. fasc. II & III (1836).

Brachysteleum, Reichenbach, Conspect, 34 (1828).
(Ptychomitrium, Glyphomitrium, partly).

GRIMMIACEAE.

Bridel, Bryolog. Univ. II, XLIII (1827).

Guembelia, Hampe in der Bot. Zeitung 124 (1846).
Grimmia, Hedwig, Fundam, hist. musc. II, 89 (1782).
(Schistidium—partly, Dryptodon partly).
Rhacomitrium, Bridel, Method. musc. 78 (1822).
(Racomitrium, Dryptodon partly).

BARTRAMIACEÆ.

Bridel, Bryolog. Univ. II, pag. XLV (1827).

Glyphocarpa, R. Brown in Transact. Linn. Soc. XII, 575 (1817).
(Philonotula, Bartramia partly.)
Conostomum, Swartz in Schraders neu. journ. I, 24 (1806).
Philonotis, Bridel, Bryol. Univ. II, 15 (1827).
Breutelia, Bruch, Schimper & Guembel, Bryol. Europ. fasc. 46 et 47 (1851).
Bartramia, Hedwig, spec. musc. frond. III, 111 (1792).
Meesia, Hedwig, Fundam, hist. musc. II, 97 (1782).

SELIGERIACEÆ.

Bruch, Schimper et Guembel, Bryol. Europ, pasc. 33–36 (1846).

Seligeria, Bruch, Schimper et Guembel, Bryol. Europ. fasc. 33–36 (1846).

BLINDIACEÆ.

Hampe in den Verhandl. der nat. Ges. von St. Gallen I, 330 (1870).
Blindia, Bruch, Schimper et Guembel, Bryol. Eur. Fasc. 33–36 (1846.)
Holomitrium, Bridel, Bryol. Univ. I, p. XLIII et 226 (1826).
(Olomitrium.)
Campylopus, Bridel, meth. musc. 71 (1822).
Eucamptodon, Montagne in Ann. des. sc. nat., trois sér. IV, 119 (1845).
Dicnemon, Schwaegrichen, Suppl. sec. I, 226, t. 32 (1824).
Dicnemonella, Hampe et C. Mueller in F. v. M. fragm. XI, suppl. 47 (1880).
(Leucodon partly.)
Cynontodium, Hedwig, Spec. musc. 57 (1801).
(Cynodontium, Trichostomum partly.)
Dichodontium, Bruch, Schimper et Guembel, Bryol. Europ. fasc. 46 & 47 (1851).
Dicranum, Hedwig, Fundam. II, 91, t. 8 (1782).

DITRICHIACEÆ.

Leptotrichaceæ, C. Mueller, synops. musc. I, 415 (1848).
Sporledera, Hampe in der Linnaea XVI, 41 (1842).
(Bruchia partly.)
Eccremidium, J. Hooker and Wilson in Lond. Journ. of Bot. V, 250 (1846).
Ditrichium, Timm, Fl. Megapol, num. 777 (1788).
Zophiodon, J. Hooker & Wilson in Lond. Journ. of Bot. III, 543 (1844).
(Leptotrichum.)
Sprucea, Wilson in J. Hooker, Fl. Antarctic I, 126 (1844).
(Holomitrium partly.)
Angstroemia, Bruch, Schimper et Guembel, Bryol. Europ. fasc. XXXIII–XXXVI (1846).
Dicranella, C. Mueller, Synops. musc. I, 430 (1848).
Symblepharis, Montagne in Annal. des sc. nat., sec. sér. VIII, 252 (1857).

WEISSIACEÆ.

Fuernrohr in der Regensb. Fl. II, Ergaenz. III, 58 (1829).
Gymnostomum, Hedwig, fundam hist. musc. II, 87 (1782).
Hymenostomum, R. Brown in Transact. Linn. Soc. XII, 527 (1819).
Weissia, Hedwig, Fund. hist. musc. II, 83, 90 (1782).
(Weisia.)
Trematodon, L. C. Richard in Michanx Fl. Bor. Amer. II, 289 (1803).
Ceratodon, Bridel, Bryol. univ. I, pag. XLIV *et* 480 (1826).

Calympereæ.

Hampe in Lehmann, Pl. Preiss. II, 116 (1846).

Calymperes, Swartz in Schwaegrichen, sp. musc. Suppl. prim. I, 333 (1816).
Thyridium, Mitten in the journ. of the Linn. Soc. X, 188 (1868).
(Codonoblepharum partly.)
Syrrhopodon, Schwaegrichen, spec. musc. Suppl. sec. I, 110 (1824).
Encalypta, Schreber, Gen. pl. II, 759 (1791).

Leucobryaceæ.

C. Mueller, Synops. Musc. I, 73 (1848).

Octoblepharum, Hedwig, spec. musc. frond. III, 15, t. 6 (1792).
Leucobryum, Hampe in der Linnaea XIII, 42 (1839).

Pottiaceæ.

Bruch et Schimper, Bryol. Europ. II, pag. III (1843).

Pottia, Ehrhart, Beitraege I, 175 (1787).
Didymodon, Hedwig, descr. musc. frond. III, 8 t. 4 (1796).
Anacalypta, Roehling, Deutschlands Moose, 108 (1800).
Trichostomum, Hedwig, Fund. hist. musc. II, 90 (1782).
Barbula, Hedwig, Fundam II, 92 (1782).
(Tortula partly.)
Streptopogon, Wilson in Hooker's Kew Gard. Misc. III, 51 (1851.)
Desmatodon, Bridel, meth. musc. 86 (1822).

Splachnaceæ.

Greville and Arnott in Mem. Wern. Soc. V., 442 (1826).

Splachnum, Linne, amoen acad. II, 263 (1750).
Dissodon, Greville and Arnott in Mem. Wern. Soc. V, 461 (1826).
(Splachnum partly.)
Tetraplodon, Bruch et Shimper, Bryol. Europ. Fasc. 23 et 24 (1844).

Funariaceæ.

Bridel, Bryolog. Univ. II, pag. XLV (1827).

Physcomitrium, Bridel, Bryolog. Univ. I, 97 (1826).
Amphoritheca, Hampe in Ann. des. sc. nat. cinq. sér. III, 340 (1865).
Entosthodon, Schwaegrichen, spec. musc. suppl. II, 441 t. 113 (1823).
Funaria, Schreber, Gen. pl. II, 760 (1791).

Phascaceæ.

Greville and Arnott in Mem. Wern. Soc. IV, 139 (1822).

Ephemerum, Hampe in der Linnaea VIII (1832).
Acaulon, C. Mueller in der Bot. Zeitung, 99 (1847).

Phascum, Linne, Phil. bot. 35 (1751).
(Astomum partly).
Sphaerangium, Schimper, synops. musc. Europ. 13 (1860).
Tetrapterum, Hampe in Verhandl. der. nat. Ges. zu St. Gallen I, 351 (1874).
Pleuridium, Bridel, Method. Musc. 10 (1822).
Pleurophascum, Lindberg in Trimen's Journ. of Bot. vol. IV, 167 (1875).

SPHAGNACEAE.

Du Mortier, Comment. bot. 68 (1822).

Sphagnum, Dillenius, Nov. gen. 86, t. 2 (1719).

ANDREAEACEÆ.

Reichenbach, Conspect. 31 (1828).

Andreaea, Ehrhart in Hannov. Mag. 1601 (1778).

The genera of mosses, as adopted here from recent authors, admit of reduction.

JUNGERMANNIEÆ.

Mathieu, Fl. Belg. II, 74 (1853); from J. E. Gray (1821).

Jungermannia, Ruppius, Fl. Jen. 345 (1718).
Plagiochila, Du Mortier, Révis. des Jungerm. 14 (1835).
Leioscyphus, Mitten in J. Hooker, Fl. Nov. Zeal. II, 134 (1855).
Lophocolea, Du Mortier, Révis. des Jungerm, 17 (1835).
Cheiloscyphos, Corda in Opiz, Nat. Tausch 651 (1829).
Psiloclada, Mitten in J. Hooker, Fl. Nov. Zeal. II, 143 (1855).
Gymnanthe, Taylor in Lehmann, Nov. pl. pug. oct. I (1844).
Podanthe, Taylor in Hooker's Lond. Journ. bot. V, 413 (1846).
Lepidozia, Du Mortier, Révis. des Jungerm. 19 (1835).
Pleuroschisma, Du Mortier, Révis. des Jungerm. 19 (1835).
(Mastigobryum.)
Isotachis, Mitten in J. Hooker, Fl. N. Zeal. II, 148, t. 100 (1855).
Scapania, Du Mortier, Révis. des Jungerm. 14 (1835).
Schistochila, Du Mortier, Révis. des Jungerm. 15 (1835).
(Gottschea.)
Polyotus, Gottsche, Lindenberg & Nees, Syn. Hepat. 244 (1845).
Schisma, Du Mortier, Comm. bot. 114 (1822).
(Sendtnera.)
Trichocolea, Nees, Eur. Leberm. III, 101–103 (1838).
(Tricholea.)
Radula, Du Mortier, Comm. bot. 112 (1822).
Bellincinia, Raddi in Atti soc. Moden. XVIII, 18 (1820).
(Madotheca.)

Phragmicoma, Du Mortier, Comm. bot. 112 (1822).
(Marchesinia.)
Lejeunia, Libert in Ann, gén. sc. phys. VI, 372, t. 5 (1820).
Frullania, Raddi in Atti soc. Moden. XVIII, 17 & 20 (1820).
Fossombronia, Raddi in Atti soc. Moden. XVIII, 17 & 40 (1820).
Zoopsis, J. Hooker & Taylor in Fl. antarct. 167, t. 66 (1845).
Blasia, Micheli nov. pl. gen. 14, t. 7 (1729).
Dilaena, Du Mortier, Comm. bot. 114 (1822).
(Blyttia, Steetzia, Pallavicina.)
Podomitrium, Mitten in J. Hooker, Fl. N. Zeal. II, 164 (1855).
Umbraculum, Gottsche in Mohl & Schlecht. bot. Zeit. 3 (1861).
Hymenophyton, Du Mortier, Revis. des Jungerm. 25 (1835).
(Symphyogyna.)
Aneura, Du Mortier, Comment. bot. 115 (1822).
(Sarcomitrion.)
Metzgeria. Raddi, Atti soc. Moden. XVIII, 45 (1820).
Marchantia, Micheli sec. Marchant in Act. Acad. Paris. 229 (1713).
Asterella, Palisot de Beauvois in Dict. III, 257 (1804).
(Reboulia.)
Fimbraria, Nees in Hor. phys. Berol. 44 (1820).
Targionia, Micheli, Nov. pl. gen. 3, t. 3 (1729).
Anthoceros, Micheli, Nov. pl. gen. 10, t. 7 (1729).
Riccia, Micheli, Nov. plant. gen. 107, t. 57 (1729).
Ricciocarpus, Corda in Opiz's Naturalien-Tausch 651 (1829).
(Riccia partly).

LICHENES.

Hoffmann, Botanisches Taschenbuch 98 (1795).

Collemaceæ.

Nylander, Synops. Lichenum 65 (1858).

Lichina, Agardh, Syn. algar. 9 (1817).
Pyrenopsis, Nylander in Mém. Soc. Chérbourg II, 13 (1854).
Physma, Massalongo, nea genea lichen. 6 (1854).
Collema, Weber in Wiggers, Primit. fl. Holsat. 89 (1780).
Synechoblastus, Trevisan, Caratt. d. tr. nov. gen. Collem. (1853).
Leptogium, Acharius Lichenogr. Univ. 654 (1810).
Obryzum, Wallroth, Fl. cryptog. German. I, 295 (1831).

Myrangiaceæ.

Nylander, Synops. Lichenum 65 (1858).

Myriangium, Montagne and Berkeley in Hooker's Lond. Journ. of Bot. IV, 72 (1845).

EPICONIODEÆ.

Nylander, Synops. Lichenum 65 (1858).

Sphærophorus, Persoon in Usteri's Annal. I, 23 (1794).
(Sphærophoron.)

CLADONIODEÆ.

Nylander, Synops. Lichenum 65 (1858).

Thysanothecium, Montagne and Berkeley in Hooker's Lond. Journ. of Bot. V, 257 (1846).
Trichocladia, Stirton in Transact. Royal. Soc. Vict. April (1881).
Cladonia, Weber in Wiggers, Prim. fl. Holsat. 90 (1780).
Bæomyces, Ehrhart, Beitraege IV, 149 (1789).
Stereocaulon, Schreber, Gen. II, 768 (1791).
Heterodea, Nylander, synops. lichen, Nov. Calendon. 9 (1868).

RAMALODEAE.

Nylander, Synops. Lichenum 65 (1858).

Eumitria, Stirton in the Scottish Naturalist, July (1881).
Usnea, Dillenius, Hist. Musc. 56, t. 11 (1741).
Thamnolia, Acharius in Schaerer enum. lich Europ. 243 (1850).
Euernia, Acharius, Lichenogr. Univers. 84 et 441 (1810).
(Evernia.)
Platysma, Hoffmann, Pl. Lichen. t. 31 (1789), from Adanson (1763). (Platisma.)
Ramalina, Acharius, Lichenogr. Univers. 122 et 598 (1810.)
Cetraria, Acharius, Method. Lichen., p. XXXV et 292 (1803).

PHYLLODEAE.

Nylander, Synops. Lichenum 66 (1858).

Nephroma, Acharius, Lichenogr. Univers. 101 et 521 (1810).
Peltigera, Willdenow, Fl. Berol. 47 (1787).
Sticta, Schreber, Gen. II, 768 (1791).
Stictina, Nylander, synops. lichen. 333 (1860).
Ricasolia, Notaris in Giorn. bot. Ital. II, 178 (1851).
Parmelia, Acharius, Meth. lichen. p. XXXIII et 153 (1803).
Physcia, Schreber, Gen. II, 768 (1791).
Pyxine, Fries., Pl. homonem. 267 (1825).

PLACOIDEAE.

Nylander, Synops. Lichenum 66 (1858).

Psoroma, Acharius, Lichen. Suec. 21 (1798).
Pannaria, Delise in Dict. classiq. XIII, 20 (1827).
Patellaria, Hoffmann, Pl. Lichen. t. 35 (1791).
Placodium, Hill, History of Plants 96 (1751).
Gyalecta, Acharius, Lichenogr. Univers. 30 & 151 (1810).

Psora, Hoffmann, Pl. Lichen. t. 22 & 41 (1789).
Coccocarpia, Persoon in Freyc. voy. bot. 206 (1826).
Lecanora, Acharius, Lichenogr. Univers. 77 & 344 (1810).
Callopisma, Notaris in Giorn. bot. Ital. II, 198 (1851).
Thelotrema, Acharius, Method. Lichen. p. XXXII & 130 (1803).
Ascidium, Fee, Cryptog. écorc. 96, t. 1 (1824).
Urceolaria, Acharius, Lichen. Suec. 30 (1798).
Pertusaria, De Candolle, Fl. française II, 319 (1805).
Blastenia, Massalongo in Regensl. flor. 573 (1852).
Biatora, Acharius, Lichenogr. Univers. 49 & 273 (1810).
Lecidea, Acharius, Method. Lichen. p. XXX & 32 (1803).
Opegrapha, Persoon in Usteri's Annal. I, 23 (1794).
Graphis, Adanson, Famill. II, 11 (1763).
Coenogonium, Ehrenberg in hor. phys. Berol. 120, t. 27 (1820).
Chiodecton, Acharius in Transact. Linn. Soc. XII, 43, t. III (1815).

Pyrenoideae.

Nylander, Synops. Lichenum 67 (1858).

Endocarpon, Hedwig, Stirp. cryptog. II, 56, t. 20 (1789).
Verrucaria, Weber in Wiggers, primit. flor. Holsat. 85 (1780).
Sarcographa, Fee, Cryptog. ecorc. 58, t. 16 (1824).
Strigula, Fries in Kongl. Acad. Handl. II, 323 (1821).
Pyrenula, Acharius, Lichenogr. Univers. 64 & 314 (1810).
Plagiothelium, Stirton in Transact. Roy. Soc. Vict. XVII, 75 (1881).

Celidieae.

Massalongo, Miscell. Lichenolog. (1856).

Abrothallus, Notaris in d'Orbigny, Dict. Univ. d'hist. nat. VII, 350 (1849).

FUNGI.

B. de Jussieu in Mem. de l'Acad. Paris 377 (1728).

Hymenomycetes.

Fries, Syst. mycol. I, p. LIII (1821).

Agaricus, Dillenius in Linné, syst. nat. 9 (1735), from Dioscorides. (Amanita.)
Coprinus, Persoon, Tentam. dispos. meth. fung. 62 (1797).
Bolbitius, Fries, Epicrisis syst. mycol. 253 (1838).
Cortinaria, Persoon, Synops. meth. fung. p. 16 & 276 (1801). (Cortinarius.)
Paxillus, Fries, Genera Hymenomycet. 8 (1836).
Hygrophorus, Fries, Epicrisis 320 (1838).
Lactarius, De Candolle, Fl. franç. II, 141 (1805).

Russula, Persoon, Observ. mycol. I, 100 (1796).
Cantharellus, Persoon, Tentam. dispos. fung. 26 (1797).
(Cantarellus.)
Marasmius, Fries, Epicrisis 372 (1838).
Lentinus, Fries, Plantae homonomeae 77 (1825).
Panus, Fries, Epicrisis 396 (1838).
Xerotus, Fries, Elench. I, 48 (1828).
(Xerotes).
Schizophyllos, Fries, Observ. mycol. I, 103 (1815).
(Schizophyllum.)
Lenzites, Fries, Epicrisis 403 (1838).
Strobilomyces, Berkeley in Hooker's Kew Misc. III, 78 (1851).
Boletus, Dillenius in Linne, Syst. nat. 9 (1735) from Plinius.
Polyporus, Micheli, Nov. pl. gen. 129, t. 70 & 71 (1829).
Trametes, Fries, Epicrisis 488 (1838).
Daedalea, Persoon, Syn. Fung. p. XVII & 409 (1801).
Hexagona, Pollini, Pl. Nov. Veron 35 (1816)
(Hexagonia.)
Favolus, Fries, Syst. mycol. I, 342 (1821).
Laschia, Fries in Linnaea V, 533 (1830).
Merulius, Haller, Enum, stirp. Helv. I, 33, (1742), from Boerhaave.
Porotheleum, Fries, Observ. mycol. II, 272 (1818).
Hydnum, Linne, Syst. edit. secund. 32 (1740).
Irpex, Fries, pl. homonem 81 (1825).
(Xylodon.)
Sistotrema, Persoon, Tentam 28 (1797).
Phlebia, Fries, Syst. mycol, I, 426 (1821).
Kneiffia, Fries, Epicrisis 529 (1838).
Grandinia, Fries, Epicrisis 527 (1838).
Odontia, Persoon, Tent. disp. 30 (1797).
Craterella, Persoon, Observ. mycol. I, 39 (1796).
(Craterellus.)
Cladoderris, Persoon in Freycinet, voy. Bot. 176 (1826).
(Cymatoderma.)
Lachnocladium, Léveillé in d'Orbigny Diction VIII, 487 (1849).
Thelephora, Ehrhart in Roth. Fl. German I, 538 (1788).
Xylostroma, Tode, fung. Medklenb. select. t. 6 (1790).
Stereum, Persoon, Observ. mycol. I, 35 (1796).
Hymenochaeta, Léveillé in Ann. des sc. nat. V, 151 (1846).
(Hymenochaete.)
Auricularia, Bulliard, Herbier de la France, I, 36, t. 290 (1787).
Corticium, Fries, Epicrisis 556 (1838).
Hypochnus, Fries, Observ. mycol. II, 278 (1818).
Dichonemia, Blume et Nees in Nov. Act. Acad. Caes. Leop. Corol. XIII, 11 (1826). (Dictyonema.)
Cyphella, Fries, syst. mycol. II, 201 (1823).
Solenia, Hoffmann, Bot. Taschenb. t. 8 (1795).

Clavaria, Vaillant, Botanicon Parisiense 39, t. 8 (1727).
Calocera, Fries, syst. mycol. I, 485 (1821).
Tremella, Hudson, Fl. Anglic. 565 (1762).
Exidia, Fries, syst. mycol. II, 220 (1823).
Hirneola, Fries, pl. homonem. 93 (1825).
Guepinia, Fries, pl. homonem. 92 (1825).
Gyrocephalus, Persoon in Mém. de la Soc. Linné Paris, III, 77 (1825).
Dacryomyces, Nees, syst. der Pilze 89 (1816).
Sebacina, Tulasne in annal. des scienc. nat. cinq. sér. XV, 225 t. X (1872).

Gasteromycetes.

Fries, syst. mycolog. I, pag. XLVIII (1823).
Dictyophora, Desvaux, Journ. de Botanique II, 92 (1809).
Phallus, Dillenius, Nov. gen. 74 (1719) from Dalechamps (1587).
Cynophallus, Fries, syst. mycolog. II, 284 (1823).
Clathrus, Micheli, Nov. pl. gen. 213, t. 93 (1729).
Aseroë, Labillardiere, Voy. à la réch. de La Perouse I, 44, t. 12 (1798). (Aseiroe.)
Anthurus, Kalchbrenner in F. v. Mueller, Fragm. XI, 89 (1880).
Lysurus, Fries, syst. mycol. II, 285 (1823).
Ileodictyon, Tulasne in Ann. des. Scienc. nat. trois. sér. II, 114 (1844).
Secotium, Kunze in Regensb. fl. 321 (1840).
Xylopodium, Montagne in Ann. dessc. nat. trois. sér. IV, 364 (1845).
Podaxon, Fries, Syst. mycol. III, 62 (1829).
Phellorinia, Berkeley in Hooker's Lond. Journ. of Bot. II, 421 (1843).
Husseia, Berkeley in Hooker's Lond. Journ. of Bot. VI, 508 (1847).
Tulostoma, Persoon, Tentam. dispos. 6 (1797).
(Tulasnodea.)
Mitremyces, Nees, Syst. der Pilze 136 (1816).
Inoderma, Berkehy in Journ. of the Linn. Soc. XVIII, 386 (1880).
(Mesophellia.)
Diderma, Persoon in Usteri's Ann. IX, 134 (1795).
Battarea, Persoon, Synops. Fung. p. XIV et 129 (1801).
Geaster, Micheli, Nov. pl. gen. 220, t. 100 (1727).
Bovista, Persoon, Tentam, disposit. 6 (1797) from Scopoli. (1777).
Lycoperdon, Tournefort, Inst. 563 t. 331 (1700).
Mycenastrum, Desvaux in Ann. des. sc. nat. sec. sér. XVII, 143, (1842).
Polysaccum, De Candolle, Fl. franc. V 103 (1815) from Desportes.
Scleroderma, Persoon, Synops. Fung. p. XIIV et 150 (1801).

Arachnion, Schweinitz in Schrift. der nat. Ges. Leipzig 14 (1822).
Hymenogaster, Vittadini, Tuberac. 30 (1831).
Hydnangium, Wallroth in Corda, Icon. fung. V, 28 (1842).
Gautiera, Vittadini, Tuberac. 25 (1831).
Octaviana, Vittadini, Tuberac. 15 (1831).
Paurocotylis, Berkeley in J. Hooker, Fl. N. Zeal. II, 188, t. CV, fig. 9 (1855).
Cyathus, Haller, Hist. stirp. Helvet. III, 127 (1768).
Crucibulum, L. R. et Ch. Tulasne in Ann. des sc. nat. trois. sér. I, 89 (1844).
Sphaerobolus, Tode, Fung. Mecklenburg. I, 43 (1790).

Myxomycetes.

Wallroth, Fl. crypt. Germ. II, 333 (1833).
Physarum, Persoon in Usteri's Ann. IX, 5 (1795).
Badhamia, Berkeley in Transact. Linn. Soc. XXI, 148 and 150 (1853).
Craterium, Trentepohl in Roth, Catalecta bot. II, 224 (1800).
Leocarpus, Link in Berl. Mag. III, 24 (1809).
Tilmadoche, Fries, Summ. veg. Scand. II, 454 (1849).
Aethalium, Link in Berl. Mag. III, 24 (1809).
Fuligo, Haller, Hist. stirp. Helvet. III, 110 (1768).
Didymium, Schrader, Nov. gen. pl. 24, t. 5 (1797).
Stemonitis, Gleditsch in Mem. Acad. Berl. 153 (1751).
Comatricha, Preuss in Linnaea XXIV, 140 (1851).
Tubulina, Persoon, Tent. disposit. 11 (1797).
Arcyria, Hill, Gener. nat. Hist. 47 (1751).
Lycogala, Micheli, Nov. pl. gen. 216, t. 95 (1729).
Trichia, Haller, Hist. stirp. Helvet. 114 (1768).
Perichaena, Fries, Pl. Homonem. 141 (1825).
Licea, Schrader, Nov. gen. pl. 16 (1797).
Hemiarcyria, Fries, Syst. mycol. III, 183 (1829).
Lamproderma, Rostafinski, Versucheines Systems der Mycetozoen (1873).

Coniomycetes.

Martius, Fl. crypt. Erlang. 308 (1717).
Sphaeronema, Fries, Observ. mycol. 187 (1815).
Phoma, Fries, Novit. fl. Suec. 80 (1819).
Excipula, Fries, Syst. mycol. II, 189 (1823).
Torula, Persoon in Usteri's Ann. IX, 25 (1795).
Gymnosporium, Corda in Sturm's Deutsch. fl. Fung. III, 69 (1836).
Nematogonium, Desmazières in Ann. dessc. nat. sec. sér. II, 69 (1834).
Aecidium, Persoon in J. F. Gmelin Syst. nat. II, 1472 (1791).
Bispora, Corda, Icon. Fung. I, 9, t. 2 (1837).

Roestelia, Rebentisch, Prodr. fl. Neomarch. 350, t. 2 (1804).
Cronartium, Fries, Observ. mycol. I, 220 (1815).
Trichobasis, Léveillé in d'Orbigny, Dict. XII, 785 (1849).
Uromyces. Link in Berl. Mag. VII, 28 (1816).
Uredo, Persoon in Usteri's Ann. IX, 16 (1795).
Puccinia, Micheli, Nov. pl. gen. 213, t. 92 (1728).
Melampsora, Castagne, Catal. des. pl. de Marseille 206, t. 5 (1845).
Cystopus, Léveillé in Ann. des sc. nat. trois. ser. VIII, 371 (1847).
Sorosporium, Rudolphi in Linnaea IV, 116, t. 2 (1829). (Schizoderma partly.)
Ustilago, Persoon, Synops. Fung. 224 (1801).
Thecaphora, Fingerhut in Linnaea X, 230 (1835).
Tilletia, L. Ch. Tulasne in Ann. des sc. nat. trois. sér. VII, 112 (1847).
Ozonium, Link in Berl. Mag. III, 21 (1809).

Hyphomycetes.

Martius, Fl. crypt. Erlang. 334 (1817).

Isaria, Persoon, Tent. disp. 41 (1797).
Stilbum, Tode, Fung. Meckl. select. I, 10, t. 3 (1790).
Myrothecium, Tode Fung. Mecklenb. select. I, 25, t. 5 (1790)
Ceratium, Albertini Schweinitz, Consp. Fung. Lusat. 358 (1805).
Bactridium, Kunze, Mycol. Hefte I, 5 (1817).
Mycothozetia, Berkeley and F. Mueller (inedited). (Thozetia, 1880).
Fusarium, Link in dem Berl. Mag. III, 10 (1809).
Aspergillus, Micheli, Nov. pl. gen. 212, t. 91 (1729).
Illosporium, Martius, Fl. crypt. Erlang. 325 (1817).
Verticillium, Nees, Syst. der Pilze 56 (1816).
Polyactis, Link in dem Berl. Mag. III, 16 (1809).
Rhinotrichum, Corda, Icon. Fung. I, 17, t. 4 (1837).
Penicillium, Link in Berlin. Magaz., III, 16, (1809).
Oidium, Link in dem Berl. Mag. III, 18 (1809).
Cladosporium, Link in dem Berl. Mag. VII, 37 (1816).
Helminthosporium, Persoon, Mycol. Eur. I, 17 (1822).
Mystrosporium, Corda, Icon. Fung. I, 12, t. 3 (1837).
Sepedonium, Link in dem Berl. Mag. III, 18 (1809).
Trichoderma, Persoon, Observ. mycol. I, 99 (1796).
Pilacre, Fries, Pl. homonem. 364 (1824).
Circinella, Tieghem & Monnier in annal. des sc. nat. cinq. sér XVII. 298 (1873).
Sporotrichum, Link in dem Berl. Mag. III, 12 (1809).
Helicostylum, Corda, Icon. Fung. V, 18 & 55, t. 2 (1842).
Mucor, Micheli, Nov. pl. gen. 215, t. 95 (1729).

Phycomyces, Kunze, Mycol. Hefte II, 113 (1823).
Antennularia, Reichenbach, Consp. 5 (1828).
(Antennaria.)
Endogone, Link in dem Berl. Mag. III, 33 (1809).

Ascomycetes.

Fries. Pl. homonem. 50 (1825).

Helvella, Linné, Spec. pl. edit. sec. 1649 (1763).
(Elvela, 1737).
Leotia, Hill, General. nat. hist. II, 43 (1751).
Mitrula, Fries, Syst. mycol. I, 491 (1821).
Geoglossum, Persoon in Usteri's Ann. IX, 11 (1795).
Peziza, Ray, Hist. pl. III, 18 & 479, t. 24 (1704).
Phillipsea, Berkehy in the journ. of the Linn. soc. XVIII, 388 (1880).
(Phillipsia.)
Helotium, Tode, Fung. Meckl. select. I, 22, t. 4 (1790).
Chlorosplenium, Fries, Summ. veg. Scand. II, 356 (1849).
Mylitta, Fries, Pl. homonem. 154 (1825).
(Notihydnum.)
Cyttaria, Berkley in the Transact. of the Linn. Soc. XIX, 40, t. IV (1841).
Ascobolus, Persoon in J. F. Gmelin, Syst. nat. II, 1461 (1791).
Bulgaria, Fries. Syst. mycol. II, 166 (1823).
Ombrophila, Fries, Summ. veg. Scand. II, 357 (1849).
Cenangium, Fries, Syst. mycol. II, 158 (1823).
(Lecanidion.)
Hysterium, Tode, Fung. Meckl. select. I, 30, t. 6 (1790).
Glonium, Muehlenberg, Catal. pl. Amer. septentr. 101 (1813).
Stictis, Persoon, Observ. mycol. II, 73 (1799).
Cordyceps, Fries, Syst. mycol. II, 323 (1823).
(Cordilia, 1818.)
Hypocrea, Fries, Syst. mycol. II, 323 (1823).
Nectria, Fries, Pl. homonem. 105 (1825).
Xylaria, J. E. Gray, Nat. arrangem. of Brit. pl. I, 510 (1821).
Poronia, Gleditsch, Syst. plant. 303 (1764).
Hypoxylon, Link, Handb. zur Erkenn. der Gew. III, 348 (1833)
(Xylaria, Hill, 1751.)
Massaria, Notaris, Cenno Pirenom. (1844).
Melogramma, Fries, Summ. veg. Scand. II, 386 (1849).
Gibbera, Fries, Pl. homonem. 110 (1825).
Dothidea, Fries, Observ. mycol. II, 347 (1818).
Diatrypa, Fries, Pl. homonem. 106 (1825).
Valsa, Adanson, Familles des plantes II, 9 (1763).
Sphaeria, Haller, Hist. stirp. Helvet. III, 121 (1768).
(Cucurbitaria.)

Sphaerella, Fries, Summ. veg. Scand. II, 395 (1849).
Ceratostoma, Fries, Observ. mycol. II, 337 (1818).
Asterina, Léveillé in Ann. des. sc. nat. trois. sér. III, 59 (1845).
Meliola, Fries, Pl. homonem. 111 (1825).
Rytisma, Fries, Syst. mycol. II, 565 (1823).

ALGAE.

Roth, Tentam fl. German III, 438 (1800).

I. FUCOIDEAE.

J. Agardh, Alg. mediterr. 24 (1842) from Agardh (1817).
(Melanospermeae largely.)

Fuceae.

J. Agardh, species, genera et ordine's Algarum, I, 180 (1848). from Agardh (1824).
Sargassum, Agardh, Spec. Alg. I, 1 (1821).
(Pterocaulon, Carpacanthus, Fucus partly.)
Turbinaria, Lamouroux in Dict. class. VII, 161 (1825).
Seirococcus, Greville, Alg. Britannic. p. XXXIV (1830).
(Cystoseira partly, Fucus partly.)
Carpophyllum, Greville, Alg. Britannic. p. XXXII (1830).
Scytothalia, Greville, Alg. Britannic. p. XXXIV (1830).
(Cystoseira, partly, Fucus partly.)
Phyllospora, Agardh in Act. Acad. Caes. Leop. XIX, 311 (1839).
(Microcystis, Fucus partly.)
Scaberia, Greville, Alg. Britannic, p. XXXVI (1830).
(Castraltia.)
Caulocystis, Areschoug in Act. Ups. ser. tert. I, 334 (1855).
(Cystoseira partly, Fucus partly.)
Cystophora, J. Agardh in Linnaea XV, 3 (1841).
(Blossevillea, Platylobium, Cystoseira partly, Fucus partly, Phyllotricha, Sargassum partly.)
Acrocarpia, Areschoug in Act. Ups. ser. tert. I, 335 (1855).
Cystophyllum, J. Agardh, Spec. Fucoid 228 (1848).
(Sirophysalis, Cystoseira partly, Fucus partly.)
Cystoseira, Agardh, Spec. Algar. I, 50 (1821).
Fucus, Morison & Bobart, pl. hist. univers. III 646–648, t. 8, fig. 5, 11, 13, t. 9, fig. 1 (1699).
Fucodium, J. Agardh, Spec. Alg. I, 200 (1848).
(Xiphophora 1842, Himanthalia, Fucus partly).
Hormosira, Endlicher, Gen. pl. 10 (1836).
(Cystoseira partly, Fucus partly, Moniliforma.)
Carpoglossum, Kuetzing in Linnaea XVII, 98 (1843).
(Platythalia, Cytoseira, Fucus and Myriodesma partly.)

Myriodesma, Descaisne in Archiv. du Mus. II, 148 (1841).
(Dictyopteris 1809, Rhodomela partly, Dictyomenia partly.)
Durvillaea, Bory in Dict. class. IX, 192 (1826).
(Sarcophycus, Laminaria partly, Fucus partly.)
Splachnidium, Greville, Alg. Britan. p. XXXVI (1830).
(Dumontia.)
Notheia, Bailey & Harvey in J. Hooker, fl. N. Zeal. II, 215, t. 109 (1855).

SPOROCHNEAE.

J. Agardh, spec. gen. et ordin. Alg. I, 160 (1848), from Meneghini (1838).

Carpomitra, Kuetzing in Linnaea XVII, 97 (1843).
(Sporochnus partly.)
Bellotia, Harvey in Ann. & Mag. of nat. hist. sec. ser. XV, 332 (1855).
Encyothalia, Harvey, Phycolog. Austral. II, t. 62 (1859).
Nereia, Zanardini in Giorn. bot. Ital. II, 41 (1851).
Sporochnus, Agardh, Synops. Algar. pag. XII et 10 (1817).
Chnoospora, J. Agardh in Oefvers. Kongl. Vet. Akad. Foerh. IV, 5 (1847).
Desmarestia, Lamouroux in Ann. du Mus. XX, 43 (1813).

LAMINARIEAE.

J. Agardh, spec. gen. et ord. Alg. I, 121 (1848), from Bory (1822).

Macrocystis, Agardh, Spec. Alg. I, 46 (1821).
Ecklonia, Hornemann in Act. Acad. Hafniens, III, 379 (1828).

DICTYOTEAE.

J. Agardh, spec. gen. et ord. Alg. I, 68 (1848), from Greville, (1830).
Haliseris, Targioni in Amoen. Ital. 314 (1819).
Padina, Adanson, Familles des plantes II, 13 (1763).
Zonaria, J. Agardh in Linnaea XV, 444 (1841).
(Stypopodium, Dictyota partly, Phycopteris.)
Lobospira, Areschoug in Act. Ups. ser. tert. I, 363 (1855).
(Metachroma.)
Taonia, J. Agardh, Spec. Fucoid. 101 (1848).
(Spatoglossum.)
Cutleria, Greville, Alg. Britan. 60 (1830).
Dictyota, Lamouroux in Desvaux, Journ. de Bot. II, 38 (1809).
Stilophora, Agardh in Regensb. Flora II, 642 (1847).
(Spilophora.)
Dictyosiphon, Greville, Alg. Britannic, 55 (1830).
Asperococcus, Lamouroux in Ann. du Mus. XX, 277 (1813).
Hydroclathrus, Bory in Dict. class. VIII, 419 (1826).
(Halodictyon, Encoelium.)

CHORDARIEAE.

J. Agardh, spec. gen. et ord. Algar. I, 45 (1848), from Harvey (1836.)

Adenocystis, J. Hooker and Harvey in Fl. Antarct. I, 179 (1845). (Aperococcus partly.)
Chorda, Stackhouse in Ann. du Mus. XX, 46 (1813).
Liebmannia, J. Agardh, Alg. Mediterr. 34 (1842).
Mesogloia, Agardh, Synops. Algar. pag. XXXVII et 126 (1817).
Cladosiphon, Kuetzing in der Linnaea XVII, 96 (1843).
Chordaria, Agardh, Synops. Algar. pag. XII et 12 (1817).
Myriocladia, J. Agardh. in der Linnaea XV, 48 (1841).
Leathesia, J. E. Gray, Arrang. of Brit. pl. I, 301 (1821). (Corynephora.)
Myrionema, Greville, Scot. Crypt. Flor. t. 300 (1827).

ECTOCARPEAE.

J. Agardh, spec. gen. et ord. Alg. I, 7 (1848), from Agardh (1824).

Cladostephus, Agardh, Synops. Algar. pag. XXV (1817).
Sphacelaria, Lyngbye, Tentam. hydrophyt. Dan. 103, t. 30–32 (1819).
Ectocarpus, Lyngbye, Tentam. hydrophyt. Dan. 130, t. 42–44 (1819).
Heterophycus, Trevisan, Saggio delle Alghe. coccotalle 101 (1848). (Desmotrichum.)

II. FLORIDEAE.

J. Agardh, Alg. Mediterr. 54 (1842) from Lamouroux (1813).

(Rhodospermeae largely.)

CERAMIEAE.

J. Agardh, Spec. gen. et ord. Alg. II, 1 (1851) from Bonnemaison (1822.)

Callithamnion, Lyngbye, Tent. Hydroph. Dan. 123 (1819).
Ballia, Harvey in Hooker's Journ. of Bot. II, 191, t. 9 (1840).
Griffithsia, Agardh, Synops. Algar. pag. XXVIII (1817).
Ptilota, Agardh, Synops. Algar. pag. XIX & 39 (1817). (Rhodocallis partly.)
Thamnocarpus, Harvey in Hooker, Icon. plant. DCLXII (1844). (Carpothamnion.)
Crouania, J. Agardh, Alg. Mediterr. 83 (1842).
Gulsonia, Harvey, in Ann. & Mag. of nat. hist. XV, 334 (1855).

Dasyphila, Sonder in Mohl et Schlechtendal's Bot. Zeit. 52 (1845).
Haloplegma, Montagne in Ann. des sc. nat. sec. ser. XVIII, 258 (1842).
Brachycladia, Sonder in Linnaea XXIII, 514 (1854).
Ceramium, Agardh, Synops. Algar. p. XXVI et 60 (1817).
Centroceras, Kuetzing in Linnaea XV, 731 & 741 (1841).

CRYPTONEMEAE.

J. Agardh, spec. gen. et ord. algar. II, 223 (1851), from Decaisne (1842).
Platymenia, J. Agardh in Kongl. Vet. Akad. Handl. 87 (1847).
(Schizymenia.)
Nemastoma, J. Agardh, Alg. Mediterr. 66 et 89 (1842).
(Nemostoma.)
Halymenia, Agardh, Synops. Algar. p. XIX et 35 (1817).
Polyopes, J. Agardh, Oefves (1849).
Grateloupia, Agardh, spec. Alg. I, 221 (1822).
Prionitis, J. Agardh, Spec. gen. et ord. Alg. II, 189 (1851).
Cryptonemia, J. Agardh, Alg. Mediterr. 100 (1842).
Thamnoclonium, Kuetzing in der Linnaea, XVII, 101 (1843).
(Polyphacum.)

GIGARTINEAE.

J. Agardh, spec. gen. et ord. alg. II, 229 (1851), from Bory (1828).
Iridaea, Bory in Dict. class. IX, 19 (1826).
Rhodoglossum, J. Agardh, Spec. gen. et ord. Alg. III, 183 (1876).
Gigartina, Stackhouse in Mem. Soc. de Mosc. II, 65 et 74 (1809).
Gymnogongrus, Martius, Enum. pl. Brasil. I, 27 (1833).
Stenogramma, Harvey in Beechey's voy. Bot. 408 (1841).
(Delessertia partly.)
Kallymenia, J. Agardh, Alg. Mediterr. 98 (1842).
(Kalymenia.)
Polycoelia, J. Agardh, Oefvers (1849).
Callophyllis, Kuetzing in der Linnaea XVII, 102 (1843).

NEMASTOMEAE.

J. Agardh, spec. gen. et ord. algar. II, 160 (1851), from Rabenhorst (1847).
Dudresnaya, Bonnemaison in journ. de Phys. XCIV et 180 (1822).
Nizzophlaea, J. Agardh, Spec. gen. et ord. Alg. III, 253 (1876).
(Dasyphlaea partly.)
Halosaccion, Kuetzing in der Linnaea XVII, 106 (1843).

Spyridieae.

J. Agardh, spec. gen. et ord. algar. II, 327 (1851), from Sonder (1852).
Spyridia, Harvey in Hooker's Brit. Fl., fifth edit. II, 336 (1841).
(Bindera 1841.)

Areschougieae.

J. Agardh, spec. gen. et ord. algar. III, 273 (1876).
Erythroclonium, Sonder in der Linnaea XXV, 691 (1852).
(Rhabdonia partly.)
Areschougia, Harvey in the Transact. of the Roy. Irish Acad. XXII, 554 (1855).
(Halymenia partly.)
Thysanocladia, Endlicher, Gen. pl. Suppl. II, 44 (1843.)
(Sphaerococcus partly, Gelidium partly.)

Champieae.

J. Agardh, spec. gen. et ord. algar. III, 290 (1876), from Kuetzing (1843).
Horea, Harvey in Transact. Roy. Irish Acad. XXII, 555 (1855).
Fauchea, Bory & Montagne, Fl. d'Alger 64 t. 16 (1846).
Chylocladia, Greville in Hooker's Brit. Fl. sec. ed. II, 297 (1833).
(Lomentaria partly.)
Champia, Desvaux, journ. de Bot. I, 245 (1808).

Rhodymenieae.

J. Agardh, spec. gen. et ord. algar. III, 307 (1876), from Harvey (1853).
Hymenocladia, J. Agardh, spec. gen. et ord. alg. II, 772 (1863).
Gloiosaccion, Harvey, Phycol. Austr. II, t. 83 (1859).
(Halosaccion partly.)
Chrysymenia, J. Agardh, Alg. Mediterr. 105 (1842).
(Gastroclonium.)
Cordylecladia, J. Agardh in Harvey's Ner. Bor. Am. II, 155 (1853).
Rhodymenia, Greville, Alg. Britannic, 84 (1830).
(Acropeltis, Sphaerococcus partly.)
Neurophyllis, Zanardini in Regensb. Fl. n. 31 (1874).
Epymenia, Kuetzing, Spec. Alg. 787 (1849).
Plocamium, Lamouroux in Ann. du Mus. XX, 137 (1813).
(Thamnophora, Thamnocarpus.)
Desmia, Lyngbye, Tent. Hydrophyt. Dan. 33 (1819).
Rhodophyllis, Knetzing in Regensb. Bot. Zeit. 23 (1847).
(Calliblepharis partly.)
Dictyopsis, Sonder in der Linnaea XXVI, 519 (1854).

SQUAMARIEAE.

J. Agardh, spec. gen. et ord. algar. II, 493 (1851), from Zanardini (1842).
Cruoria, Fries, Fl. Scanica, 31 (1835).
Peyssonelia, Decaisne in Archiv. du Mus. II, 168 (1841).
Rhodopeltis, Harvey, Phycol. Austr. V, t. 264 (1863).

CORALLINEAE.

J. Agardh, spec. gen. et ord. alg. II, 506 (1852), from Meneghini (1838).
Melobesia, Lamouroux, Polypiers flex. corallig. 315 (1816).
Lithothamnium, Philippi in Wiegmann's Archiev fuer Naturg. III, 387 (1837). (Lithothamnion.)
Mastophora, Descaisne in Ann. des. se. nat. sec. sér. XVII, 359 et 365 (1842).
Amphiroa, Lamouroux in Bullet philomat. (1812).
Cheilosporum, Decaisne in Ann. des. sc. nat. sec. sér. XVIII, 125 (1842).
Arthrocardia, Decaisne in Ann. des. sc. nat. sec. sér. XVII, 159 (1842). (Amphiroa partly.)
Jania Lamouroux in Bulletin philomatique (1812).
Corallina, Tournefort, Inst. rei herb. 570, t. 338 (1700).

SPHAEROCOCCEAE.

J. Agardh, spec. gen. et ord. Algar II, 577 (1852), from Du Mortier (1822).

Nizymenia, Sonder in der Linnaea XXVI, 520 (1854).
(Areschougia partly.)
Phacelocarpus, Endlicher & Diesing in der Bot. Zeitung, 290 (1845). (Ctenodus, Sphaerococcus partly.)
Curdiea, Harvey in Ann. & Mag. of nat. hist., sec. ser. XV, 333 (1855).
Melanthalia, Montagne in Ann. des sc. nat. sec. sér. XX, 296 (1843).
Dicurella, Harvey, Nereis Austral. t. 50 (1849).
(Cystoclonium partly.)
Corallopsis, Greville, Alg. Britannic. p. LIV & 121 (1830).
Gracilaria, Greville, Alg. Britannic. p. LIV & 121 (1830).
(Plocaria, Sphaerococcus partly.)
Sarcocladia, Harvey in Transact. Roy. Irish Acad. XXII, 550 (1855).
Tylotus, J. Agardh, Spec. gen. et ord. Alg. III, 428 (1876).
(Gymnogongrus partly, Rhodomenia, Curdiea partly.)
Sarcodia, J. Agardh, Spec. gen. et ord, Alg. II, 622 (1855).
Calliblepharis, Kuetzing in der Linnaea XVII, 102 (1843).
(Rhodophyllis partly, Rhodymenia partly.)

Dicranema, Sonder in Mohl & Schlecht. Bot. Zeit. 45 (1845).
(Gracilaria partly, Cystoclonium partly, Sphaerococcus partly.)
Heringia, J. Agardh, Alg. Mediterr. 68 (1842).
Stenocladia, J. Agardh, Spec. gen. et ord. Alg. III, 438 (1876).

Delessertieae.

J. Agardh, spec. gen. et ord. Alg. II, 650 (1852), from Bory (1828).

Nitophyllum, Greville, Alg. Brit. p. XLVII (1830).
(Aglaophyllum.)
Rhodoseris, Harvey, Nereis Austral. 22 (1847).
Delessertia, Greville, Alg. Brit. p. XLVII & 71 (1830).
(Delesseria, Chauvinia, Hemineura, Hypoglossum.)
Caloglossa, Harvey, Ner. Bor. Americ. II, 98 (1853).

Helminthocladeae.

J. Agardh, spec. gen. et ord. Alg. II, 410 (1851).

Helminthocladia, J. Agardh, Spec. gen. et ord. Alg. II, 412 (1851).
Helminthora, J. Agardh, Spec. gen. et ord. Alg. II, 415 (1851).
Nemalion, Targioni in A. Bertoloni, Amoen. Ital. 300 (1819).
Gloiophlaea, J. Agardh in Physiogr. Saells. Moete Lund 28 (1870).
Scinaia, Bivona in Iride Palermo c. icon. (1822).
Liagora, Lamouroux, Polypièr, flex. corallig. 237 (1816).
Galaxaura, Lamouroux in Bullet. philomat. (1812).
(Alysium.)
Actinotrichia, Decaisne in Ann. des sc. nat. sec. sér. XVIII, 118 (1842).

Chaetangieae.

J. Agardh, spec. gen. et ord. alg. II, 456 (1851), from Trevisan (1848).

Zanardinia, J. Agardh, Spec. gen. et ord. Alg. III, 533 (1876).
Bindera, Harvey, Phycol. Austr. CXI (1859).
(Chondriosiphon.)
Chaetangium, Kuetzing in der Linnaea, XVII, 101 (1843).
Acrotylus, J. Agardh, Oefvers, Stockholm (1849).
Hennedya, Harvey in the Transact. of the Roy. Irish Acad. XXII, 552 (1855).

Gelidiaeae.

J. Agardh, spec. gen. et ord. Alg. II, 464 (1851), from Trevisan (1848).

Pterocladia, J. Agardh, spec. gen. et ord. Alg. II, 482 (1851).
(Phyllophora partly, Sphaerococcus partly.)
Gelidium, Lamouroux in Ann. du Mus. XX, 128 (1813).
Suhria, J. Agardh, Alg. Mediterr. 68 (1842).
Ptilophora, Kuetzing in Mohl & Schlecht. Bot. Zeit. 25 (1847).

HYPNEACEAE.

J. Agardh, Spec. gen. et ord. Algar II, 430 (1851).

Gattya, Harvey in Transact. Roy. Irish Acad. XXII, 555 (1855).
Hypnea, Lamouroux in Ann. du Mus. XX, 131 (1813).
Rhododactylis, J. Agardh, Spec. gen. et ord. Alg. III, 566 (1876).
(Chondria partly.)
Dasyphlaea, Montagne, Prodr. phyc. antarct. 8 (1842).
Mychodea, J. Hooker & Harvey in Lond. Journ. of Bot. VI, 407 (1847). (Lecithites, Acanthococcus.)
Ectoclonium, J. Agardh, spec. gen. et ord. Alg. III, 573 (1876).

SOLIERIEAE.

J. Agardh, spec. gen. et ord. Algar II, 721 (1852).

Gelinaria, Sonder in Mohl & Schlechtendal's Bot. Zeitung 53 (1845). (Halymenia partly.)
Meristotheca, J. Agardh in Physiogr. Saellsk. Moete, Lund 36 (1870). (Kallymenia partly, Kalymenia partly.)
Catenella, Greville, Alg. Britannic. 166 (1830).
(Dumontia.)
Rhabdonia, J. Hooker & Harvey in Lond. Jour. of Bot. VI, 408 (1847). (Dumontia, Chrysymenia, Erythroclonium, Gigartina, Soliera all partly.)
Soliera, J. Agardh, Alg. mediterr. 156 (1842).
Eucheuma, J. Agardh, Oefvers. Kongl. Vet. Ak. Förh. IV, 5 (1847). (Gigartina partly.)

WRANGELIEAE.

J. Agardh, spec. gen. et ord. alg. II, 701 (1852), from Trevisan (1848).

Monospora, Solier in Castâgne, Catal. pl. Marseille 242, t. 7 (1845).
Bornetea, Thuret in Mem. Soc. des sc. nat. Cherbourg III (1855).
(Griffithsia partly.)
Wrangelia, Agardh, spec. Alg. II, 136 (1828).
(Phlebothammion, Dasya partly.)

LOMENTARIEAE.

J. Agardh, spec. gen. et ord. alg. II, 724 (1852) from Naegeli (1847).

Lomentaria, Lyngbye, Tent. hydrophyt. Dan. 101, t. 30 (1819).

CHONDRIEAE.

J. Agardh, spec. gen. et ord. Alg. II, 716 (1852).

Coeloclonium, J. Agardh, spec. gen. et ord. Alg. III, 639 (1876).
(Chondria partly, Chylocladia partly.)

Corynecladia, J. Agardh, spec. gen. et ord. Alg. III, 642 (1876).
(Laurencia partly, Chondria partly.)
Laurencia, Lamouroux in Ann. du Mus. XX, 130 (1813).
(Chondria partly.)
Asparagopsis, Montagne in Webb et Berthelot phytogr. Canar. p. XV (1840).
Delisea, Lamouroux in Dict. des sc. nat. XIII, 41 (1819).
(Bonnemaisonia, Bowiesia, Calocladia.)
Ptilonia, Harvey, Nereis Austr. 124 (1847).
Leptophyllis, J. Agardh, spec. gen. et ord. Alg. III, 675 (1876).
(Cladhymenia partly.)

Rhodomeleae.

J. Agardh, spec. gen. et ord. alg. 787 (1863).

Claudea, Lamouroux in Ann. du Mus. XX, 121 (1813).
(Oneillia.)
Martensia, Hering in Ann. of nat. hist. VIII, 90 (1841).
(Hemitrema.)
Dictyurus Bory in Bélanger, Voy. aux Ind. Or. 170 (1836).
(Thuretia.)
Hanowia, Sonder in Mohl & Schlechtendal's Bot. Zeitung 52 (1845).
(Halodictyon, partly.)
Cliftonaea, Harvey, Phycol. Austr. t. 100 (1859).
(Cliftonia.)
Amansia, Lamouroux in Desvaux, Journ. de Bot. II, 123, (1809).
(Delessertia partly, Kuetzingia partly.)
Leveillea, Decaisne, in Ann. des. sc. nat. sec. sér. XI, 375 (1839).
(Amansia partly.)
Polyzonia, Suhr in der Regensb. Flora, 739 (1834).
Neurymenia, J. Agardh, spec. gen. et ord. Alg. II, 1134 (1863).
Vidalia, Lamouroux in Diction. class. V, 387 (1822).
Kuetzingia, Sonder in Mohl & Schlechtendal's Bot. Zeitung 46 (1845).
(Rhytiphlaea partly.)
Lenormandia, Sonder in Mohl & Schlechtendal's Bot. Zeitung 54 (1845).
Osmundaria, Lamouroux, Essai sur les gen. des Thalassiophyt. 23, t. VII (1813). (Polyphacum.)
Jeanneretia, J. Hooker & Harvey in Lond. Journ. of Bot. VI, 398 (1847).
(Botryoglossum, Delessertia partly.)
Melanoseris, Zanardini in der Regensb. Flora n. 31 (1874).
Pollexfenia, Harvey in Hooker's Lond. Journ. of Bot. III, 431 (1844).
Sarcomenia, Sonder in Mohl & Schlechtendal's Bot. Zeit. 56 (1845).

Acanthophora, Lamouroux, Essai sur les gen. des Thalassiophyt. 44 (1813).
Dictymenia, Greville, Alg. Britannic pag. L (1830).
(Epineuron, Amansia partly, Delessertia partly.)
Heterocladia, Decaisne in Archiv. du Mus. II, 178, t. 5 (1841).
Trigenea, Sonder in Mohl & Schlechtendal's Bot. Zeitung 54 (1845).
Rhodomela, Agardh, spec. Algar. I, 36 (1823).
Rhytiphlaea, Agardh, Synops. Algar. pag. XXV (1817).
(Halopithys Rytiphlaea.)
Alsidium, Agardm, in der Regensb. Flora, 639 (1827).
Chondriopsis, J. Agardh, spec. gen. et ord. Algar. II, 794 (1863).
Digenea, Agardh, spec. Algar. I, 388 (1823).
Bostrychia, Montagne in de la Sagra, Hist. de Cuba IX, 39 (1842).
Hutchinsia, Agardh, Synops. Alg. pag. XXVI (1817).
(Polysiphonia.)
Dasya, Agardh, System. Algar. num. 78 (1824).

III.—ZOOSPERMEAE.

J. Agardh, alg. mediterran. 1 (1842).

(Chlorospermeae, largely.)

Siphonaceae.

Harvey, Nereis bor. Americ. III, 9 (1858).

Caulerpa, Lamouroux in Desvaux, Journ. de Bot. II, 141 (1809).
(Ahnfeldtia, Chauvinia partly.)
Halimeda, Lamouroux in Bull. de la Soc. philom. (1812).
(Halymeda, Flabellaria.)
Codium, Stackhouse, Nereis Britannic, Praef. 24 (1801).
Chlorodesmis, Bailey & Harvey, Nereis Bor. Am. III, 29 (1858).
Vaucheria, De Candolle in Vaucher, Mém. sur les graines des Conf. 25 (1800).
Bryopsis, Lamouroux in Desvaux, Journ. de bot. II, 133, t. 3 (1809).
Udotea, Lamouroux, Hist. des polyp. corallig. flex. 311, pl. XII (1816).

Dasycladeae.

Harvey, Nereis bor. Americ. III, 33 (1858) from Kuetzing (1843).

Polyphysa, Lamouroux, Hist. des polyp. corallig. flex. 252, pl. VIII (1816).
Acetabularia, Lamouroux, Hist. des polyp. corallig. flex. 244, pl. VIII (1816).
Neomeris Lamouroux, Hist. des polypièrs corallig. flex. 241 (1816). (Bornetella.)

Chlorocladus, Sonder, Alg. des trop. Austr. 35, t. V (1871).
Pleiophysa, Sonder in F. v. M. fragm. phytogr. Austr. XI, 39 (1880). (Polyphysa partly.)

VALONIEAE.

Kuetzing, spec. alg. 507 (1849) from Zanardini (1843).

Penicillus, Lamouroux in Ann. du Mus. XX, 297 (1813).
(Corallocephalus.)
Microdictyon, Decaisne in Archiv. du Mus. II, 115 (1839).
(Hydrodictyon partly.)
Struvea, Sonder in Mohl & Schlechtendal's Bot. Zeitung 49 (1845).
Apjohnia, Harvey in Ann. and Mag. of nat. hist. XV, 335 (1855).
Dictyosphaeria, Decaisne in Ann. des sc. nat. sec. sér. XVII, 328 (1842).
Anadyomene, Lamouroux, Hist. des polyp. flex. 365 (1816).

ULVACEAE.

Harvey, Nereis bor. americ. III, 51 (1858) from Lamouroux (1813).

Porphyra, Agardh, Spec. Algar. I, 404 (1823).
Ulva, Lamouroux in Ann. du Mus. XX, 277 (1813), from Ray (1704).
Enteromorpha, Link in Hor. phys. Berol. 5 (1820).
(Phycoseris.)
Schizogonium, Kuetzing in Linnaea XVII, 89 (1843).
Bangia, Lyngbye, Tentam. hydroph. Dan. 84, t. 24 (1819).
Tetraspora, Link in Schrader's Neuem Journ. III, 9 (1809).

BATRACHOSPERMEAE.

Harvey, Nereis bor. Americ. III, 61 (1858), from Agardh (1824).

Batrachospermum, Roth, Tent. fl. germ. III, 450 (1800).
Lemanea, Bory in Ann. du. Mus. XII, 181 (1808).
Draparnaudia, Bory in Ann. du. Mus. XII, 399 (1808).
(Draparnaldia.)
Stigeoclonium, Kuetzing, Spec. Alg. 352 (1849).

CONFERVEAE.

Harvey, Nereis bor. Amer. III, 69 (1858), from Stackhouse (1809).

Spongocladia, Areschoug in Oefvers. Vet. Acad. Foerh. X, 201 (1853).
Cladophora, Kuetzing in der Linnaea XVII, 91 (1843).
Chaetomorpha, Kuetzing, Phycol. German. 203 (1845).
(Aplonema.)

Conferva, Kuetzing, Phycol. German. 201 (1845), from Link and Agardh.
Oedogonium, Link in Hor. phys. Berol. 5 (1820).
(Vesiculifera.)
Bulbochaeta, Agardh, synops. algar. XXIX et 71 (1817).
Rhizoclonium, Kuetzing in der Linnaea XVII, 90 (1843).

ZYGNEMEAE.

Harvey, Nereis bor. Americ. III, 92 (1858), from Fries (1825).

Mougeotia, Agardh, System. Algar. p. XXVI et 83 (1824).
Mesocarpus, Hassall in Ann. and Magaz. of Nat. Hist. XV, 185 (1843).
Zygnema, Agardh, System. Algar. p. XXIII et 77 (1824).
(Tyndaridea partly.)
Spirogyra, Link in Schrader's Neuem Journ. III, 10 (1809).
Zygogonium, Kuetzing in Linnaea XVII, 92 (1843).
(Tyndaridea partly.)

MASTICHOTRICHEAE.

Kuetzing, phycolog. gener. 231 (1843).

Mastichothrix, Kuetzing in der Linnaea XVII, 88 (1843).
Schizosiphon, Kuetzing in der Linnaea XVII, 88 (1843).

OSCILLATORIEAE.

Harvey, Nereis bor. Amer. 96 (1858), from J. E. Gray (1821).

Hydrocoleum, Kuetzing in der Linnaea XVII, 86 (1843).
Leibleinia, Endlicher, Gen. pl. 5 (1836).
Lyngbya, Agardh, Aphorism. bot. 9 (1821).
Rivularia, Roth, Catalecta bot. I, 212 (1797).
Heteractis, Kuetzing in der Linnaea XVII, 89 (1843).
Tolypothrix, Kuetzing in der Linnaea XVII, 88 (1843).
Calothrix, Agardh, spec. algar. XXIV et 70 (1824).
Schizothrix, Agardh, System. Algar. p. XXIV et 70 (1824).
Oscillatoria, Vaucher, Hist. des Conferv. t. 15 (1803).
(Oscillaria.)
Leptothrix, Kuetzing in der Linnaea XVII, 86 (1843).
Vibrio, O. F. Mueller, vermium histor. 39 (1773).
Scytonema, Agardh, Synops. Algar. p. XXXIV et 112 (1817).
Sirosiphon, Kuetzing in der Linnaea XVII, 87 (1843).
(Hassallia.)

NOSTOCEAE.

Harvey, Nereis bor. Amer. III, 110 (1858), from Leman (1816).

Nostoc, Vaucher, Hist. des Conferv. 203 (1803), from Vaillant (1708).
Sphaerozyga, Agardh in der Regensb. Flora, 634 (1827).

Protococcus, Agardh, System. Alg. pag. XVII et 13 (1824).
Pediastrum, Meyen in nov. act. acad. Caes. Leop. Car. XIV, 772, t. XLIII (1829).
Scenedesmus, Meyen in nov. act. acad. Caes. Leop. Car. XIV, 775, t. XLIII (1829).
Trichodesmium, Ehrenberg in Poggendorf's Annal. 506 (1830).
(Anabaena partly.)
Chlamydomonas, Ehrenberg, Infusor. 64 (1833).
Volvox, Linné, syst. nat. ed. derim. (1758).

Desmidiaceae.

Kuetzing in der Linnaea VIII, 591 (1833).

Penium, Brébisson in Ralfs' Brit. Desmid. 150, t. XXV (1848).
Closterium, Nitzsch in den Schrift. der nat. Ges. zu Halle I, (1817).
Pleurotaenium, Naegeli, Gattung. einzell. Alg. 104 (1849).
(Docidium.)
Cosmarium, Corda, Animalc. microsc. auprès de Carlsbad 121 (1835).
Micrasterias, Agardh in der Regensb. Flora II, 642 (1827).
Staurastrum, Meyen in Nov. Act. Ac. Caes. Leop. Carol. XIV, 777 (1829).
Arthrodesmus, Ehrenberg, Infus. Tpierck. 152 (1838).

IV. DIATOMACEAE.

Agardh, Conspect. Diatom. I (1830). (Transit to the animal forms of life).

Cyclotella, Kuetzing in der Linnaea VIII, 535 (1833).
Coscinodiscus, Ehrenberg, Kreide-Thierchen (1838).
Actinocyclus, Ehrenberg, Kreide-Thierchen 57 (1840).
Meloseira, Agardh, Syst. Alg. p. XIV & 8 (1824).
(Melosira.)
Campylodiscus, Ehrenberg, Bericht. Berl. Akad. 11 & 205 (1839).
Surirella, Turpin in Mem. du Mus. XVI, 361 (1827).
(Tryblionella.)
Epithemia, Kuetzing, Phycol. German. 57 (1843).
Himantidium, Ehrenberg, Bericht. Berl. Akad. 17 & 212 (1840).
Cymbella, Agardh, Consp. Diatom. 1 (1830).
Cocconema, Ehrenberg, Infusion's Thierchen, t. XIX (1838).
Amphora, Ehrenberg, Bericht. Akad. Berl. 205 (1840).
Encyonema, Ruetzing in der Linnaea VIII, 589 (1833).
Cocconeis, Ehrenberg, Infus. Thierch. 193 (1838).
Cymbosira, Kuetzing, Kieselsch. Bacill. 77, t. 20 (1844).
Achnanthes, Bory in Dict. class. 79 & 593 (1822).

Fragilaria, Lyngbye, Tent. hydroph. Dan. 182 (1819).
Synedra, Ehrenberg, Infus. Thierch. 212 (1838).
Sigmatella, Kuetzing in der Regensb. Flora 693 (1833). (Nitzschia.)
Navicula, Bory in Dict. class. XI, 472 (1826).
Pinnularia, Ehrenberg, Ber. Akad. Berl. 213 (1840).
Orthoseira, Thwaites in Ann. and Mag. of Nat. Hist. Sec. Ser. I, 167 (1848).
Hyalodiscus, Ehrenberg, Ber. Berl. Akad. 71 & 78 (1845).
Pleurosigma, W. Smith, Synops. of Brit. Diatomac., t. XXI & XXII (1853).
Stauroneis, Ehrenberg, Verbreit. des microsc. Lebens. in Amer. 134–135, t. I & II (1843).
Gomphonema, Agardh, Syst. Alg. p. XVI & 11 (1824).
Tabellaria, Ehrenberg, Ber. Berl. Akad. 217 (1839.)
Grammatophora, Ehrenberg, Kreide Thierch. 74 (1840).
Hydrosera, Wallich in the Journal of the Microsc. Soc. VI, t. XIII (1838).

The generic synonymy of the Acotyledoneae is largely omitted.

Further tribal subdivision of Zoospermeae and Diatomaceae admissible from Rabenhorst, flor. Europ. alg. aq. dulc. et submarin. (1864–1868).

With a future supplement of such genera of plants as may hereafter yet be proved to exist likewise in this part of the globe, will also be given a list of all the genera of fossil plants hitherto found in Australia.

Additions to the Census of Genera of Plants hitherto known as indigenous to Australia, by Baron von Mueller.

Aporosa, Blume, Bijdrag, 514 (1825), after Securinega.
Euchilopsis, F. v. M. in Melb., Chemist, June (1882), after Dillwynia.
Podopetalum, F. v. M. in Melb., Chemist, June (1882), after Castanospermum.
Emilia, Cassini, in bullet. de la soc. philomat. 68 (1817), after Gynura.
Fitzgeraldia, F. v. M. in Wing's South. Science Record, II, 56 (1882), after Lyperanthus.
Neuropogon, Nees et Flotow in Linnaca IX, 496 (1834), after Usnea.
Nephromium, Nylander, synops. method. lichen. 318 (1860), after Nephroma.
Glyphis, Acharius, synops. lichen. 106 (1814), after Chiodecton.
Arthonia, Acharius in Schrader's neuem Journ. I, 3 p. 1 (1806), after Opegrapha.
Trypethelium, Sprengel, Anleitung zur Kenntn. der Gew. III, 350, t. 10 (1804), after Strigula.
Poniophora, Cooke, Grevillea VIII, 20 (1879), after Hymenochaete.
Chondrioderma, Rostafinski, Sluzowce 167 (1875), after Stemonitis.
Clathroptychium, Wallroth in Rostaf. Sluzowce 122 (1875), after Comatricha.
Prototrichia, Rostafinski, Sluzowce suppl. 38 (1876), after Lamproderma.
Sphaerostilbe, Tulasne, carpol. fung. I, 30 (1861), after Hypocrea.
Cucurbitaria, J. E. Gray, Arrangm. of Brit. pl. I, 508 & 519 (1821), after Sphaeria.
Psilosphaeria, Cooke, Grevillea VII, 84 (1879), after Sphaerella.
Byssosphaeria, Cooke, Grevillea VII, 84 (1879), after Valsa.
Lasiosphaeria, Cesati & Notaris, schema di class. Sphaer. 55 (1863), after Valsa.
Eutypa, Tulasne, carpol. fung. II, 52 (1863), after Valsa.
Cymatopleura, W. Smith, Diatom. I, 37 t. 10 (1853), after Surirella.
Eunotia, Ehrenberg, Verbreit. des microsc. Lebens in Amer. t. III, (1843), after Epithemia.
Diatoma, Candolle, fl. francaise II, 48 (1805), after Fragilaria.
Raphoneis, Ehrenberg in Monatsber. der k. Akad. der Wiss. zu Berlin 87 (1844), after Fragilaria (Doryphora).

Amphiprora, Ehrenberg, Verbreitung des micr. Lebens 113 & 122, t. II (1843), after Stauroneis.

Biddulphia, J. E. Gray, arrangement of Brit. pl. I, 294 (1821), after Grammatophora.

Barteriastrum, Shabolt in Pritchard, hist. of Infusoria 863 (1860), after Hydrosera.

Auliscus, Ehrenberg in Monatsberichten 77 (1844), after Hydrosera.

Dictyocha, Ehrenberg, Kreidethierchen 68-70, t. IV (1838), after Hydrosera.

Triceratium, Ehrenberg, Kreidethierch. 79 (1840), after Hydrosera.

INDEX.

Digitized by Google

Notes on Wool.

By P. N. Trebeck.

[Abstract of a Lecture delivered on November 2nd, 1881.]

Mr. Trebeck commenced his subject by giving a description of wool, and showing the difference between it and hair, illustrating it by several well executed microscopic drawings by Mr. Hirst and Mr. Ebsworth, after which he gave its history from the earliest days to the present time, alluding particularly to the establishment and development of the merino flocks in Australia. He then proceeded as follows:—

"To show how well our Colonies are adapted for sheep and the growth of wool, I will quote from the Statistical Returns for 1880 furnished by the Registrars-General of Victoria and our own Colony. It appears that we head the return with 32,399,547 sheep (our Stock Inspectors return an estimate of 35,000,000), and the total for Australia and New Zealand, 72,239,343 sheep. Our Chief Inspector of Stock estimates that 5 lbs. 7 ozs. is the average weight of clip. I consider that too high; but supposing that each sheep cuts 5 lbs.—that is even too high, I fear—and that we shall this year shear 35,000,000 sheep, our New South Wales produce of wool, at 10d. per lb., will amount to £7,291,666, and the produce of all our Colonies and New Zealand—say 80,000,000 at the same price would come to £16,666,666, besides the large quantity of fellmongered wool, which may be fixed at about £2,000,000. Australasia is essentially a pastoral country, and I think if our graziers could only get a reasonable tenure they would so improve their runs by fencing and water supply that we should soon double or even treble our present number of sheep and grow the highest qualities of wool as cheaply and as well as any country in the world.

I will now proceed to describe the various kinds of wool, but must confine myself principally to those used in our ordinary manufactures. The kind we are most interested in here is the merino. You see before you some of the finest and highest quality combing wool in the world. We can for this description hold our own against any country. The Austrians and Germans can beat us for fine quality clothing, such as you see on the table. Our pastoralists appear to have left off growing clothing wool, as

the combing gives a heavier and a more profitable fleece. Those who have imported and used Austrian and German rams find that the tendency of the country and climate is to gradually add to the length of the staple, without much increasing the stoutness of the fibre, retaining at the same time its soundness, elasticity, softness, and colour, and even improving in that lustre and freeness which makes a combing wool specially valuable. Keeping up the denseness appears to be the greatest trouble, especially in our western saltbush districts. For growing the highest quality combing wool the pastures must be moderately generous and succulent, and the climate not too arid. I would point out such country as Sir Samuel Wilson's Ercildoune, and Mr. Philip Russell's Carngham, in Victoria. The richer parts of the Mudgee district, Messrs. Clive and Hamilton's Collaroy, and generally, the sheep country on our western slopes, from 1,000 to 2,300 feet above the sea, should also grow high-class wools. In Tasmania the pastures of Messrs. Gibson, Kermode, and Taylor, give very excellent results.

I would here add that the Murrumbidgee district, which at one time was considered unfit for growing good wool, now produces a very large quantity of the highest class of combing wool. Most of the flocks have been established for many years, and are heavily culled by experienced sheep-classers every year. Without a skilful and heavy annual culling of ewes, it is almost useless to try growing good wool.

By means of this heavy culling, not only the quality but the average yield for sheep has been gradually increased. In 1860 the average was 3 lbs. of greasy wool, whereas now in fair seasons it is estimated at from 4½ lbs. to 4¾ lbs., and up to 5 lbs. I would add that many flocks cut an average of 6 lbs., and some reach 7 lbs.

I would also bring under your notice a few of the prize samples from the Melbourne International Exhibition. Having had the honor of being one of the judges, I had a good opportunity of examining the exhibits thoroughly. Possibly such a grand exhibition of the highest class of combing wools could not be produced anywhere else; at any rate, it was generally so admitted by the visitors from all countries who saw it. I regret to say our Colony did not make a creditable display. The Mudgee and other leading flockmasters did not exhibit. You will see in the box as good samples of both washed and greasy combing as can be produced in any part of the world. The following gentlemen took the leading prizes:—Sir Samuel Wilson, Messrs. J. Gibson, W. Gibson and Sons, Philip Russell, J. L. Currie, T. Shaw, A. Buchanan, E. W. Pitts, and Austin and Millear. The thanks of the colonists are due to these and other stud flockmasters for bringing our sheep to their present state of perfection, and so adding very materially to our national wealth.

You also see a sample of German clothing wool. The staple is only about half an inch long, and in comparing it with Mr. T. Cummings's and the other samples of long combing wool, it appears almost incredible that our present leading flocks are descended from similar sheep imported from Germany many years ago.

Next to the merino wool, the Lincoln, Leicester, and Cotswold types are the most valuable. Only a very limited number of pure sheep are kept in our Colony. Mr. Higgins and Mr. Willsallen appear to have the greatest number of crossbred Lincoln and merino sheep, and consider them a profitable variety to keep. The special quality of lustre, so valuable in these coarse wools, appears to be fairly well maintained. The pure Lincoln sheep has been found to cross better with the merino than Leicester or any other coarse-woolled type.

While showing you all the good samples, I must not forget to say that frequently wool comes to our market in a very different state from them. In one you will see the spear grass from the coast country within 100 miles of Rockhampton. From its peculiar barbed formation it will go right through the skin and flesh and kill the sheep and lambs in a few days. The spread of this grass has quite driven sheep away from the coast district of Queensland. Also, some wool with grass seed, from our own Colony. In others you will see the two different kinds of burr, viz., the Bathurst burr and the clover or trefoil burr. The former is now easily extracted by machinery, but the latter is much more tiresome.

There is also a small kind of carrot-seed which is difficult to get out. All these spoil the wool for high-class goods, and detract from the value from 2d. to 5d. per lb.

I will now briefly draw your attention to some foreign wools, which appear in strong contrast with our delicate high-class merino:—

No. 1. East India, Marwar, grey.
2. Adrianople, unwashed black.
3. East India, Vicanare, 2nd white.
4. Varna, unwashed black.
5. Smyrna, unwashed white.
6. Russian, autumns.
7. Russian, Donskoi fleece.
8. Upper Egyptian, yellow fleece.
9. Chilian, unwashed fleece.
10. Shropshire wethers.

These have been kindly lent to me by Mr. Chard.

Mr. F. Ebsworth has been good enough to let me have a dozen foreign samples, all possessing merits for various kinds of clothing and manufactures, which are placed before you. You will observe where they are grown, their measurement under the micrometer, and their value per lb. in the London market in 1878. In the Cashmere wool the hairs are all picked out from the wool singly

by hand. Each goat does not yield more than 3 ozs. of the delicate kind of down or wool which is woven into the celebrated Cashmere shawls, which sell in London up to 300 and 400 guineas.

No.	Description.	Where grown.	Measurement—part one inch.	Value per lb.
19	Vicuna fleece	S. America ...	1-2348	36d.
20	Mohair fleece	Turkey ...	1-807	21
51	White Cashmere	Cashmere ...	Wool 1-2120 Hair 1-299	33
52	Brown Cashmere	Cashmere ...	Wool 1-1720 Hair 1-349	20
53	China white Cashmere	Cashmere ...	Wool 1-1544 Hair 1-322	18
55	China fair washed sheep's wool ...	China ...	1-1051	6½
56	Superior camel's hair	India	1-1416	10
58	Cape super snow white	Cape	1-1288	22½
86	Extra super clothing	Germany ..	1-1434	36
88	Extra super clothing	Germany ...	1-1516	36
89	Silesian Reindorfel, Heinrichen ...	Germany ...	1-1410	35
92	Mosuran, Upper Silesia	Germany ...	1-1758	32
17	Islay alpaca fleece	W. Coast, S.A.	White 1-1331 Black 1-1571	14½

Dr. Wright, our Hon. Treasurer, has kindly measured for me some German wool, and also some of the choice samples of our colonial wool, with the following results :—

No.	Where grown.	Measurement in parts of inch.	Average.
1	German clothing greasy	1-767 to 1-1041	1-1000
2	German clothing scoured	1-767 to 1-1666	1-1428
3	Mudgee clothing washed	1-1000 to 1-1428	1-1136
4	Tasmanian lambs' wool greasy .	1-306 to 1-1515	1-1190
5	Victorian ewes' greasy	1-1250 to 1-2000	1-1562
6	Tasmanian greasy	1-1111 to 1-2173	1-1250
7	Australian merino—Victoria greasy hoggets	1-1250 to 1-1470	1-1428
8	Australian merino—Victoria ewes' greasy	1-1111 to 1-1428	1-1250
9	Tasmanian greasy	1-1111 to 1-1350	1-1231
10	South Australian greasy	1-746 to 1-1063	1-1000
11	Lincoln wool greasy	1-555 to 1-666	1-609
12	Russian Donskoi fleece	1-270 to 1-714	1-500

I will now proceed with the qualities of wool. A good merino combing wool should possess—

1. Fineness of fibre and length.—The finest we have measures under the micrometer unwashed, 1–1227th inch, washed, 1–1405th inch. The length should be 2½ to 3½ inches.
2. Softness and elasticity.—These are necessary for producing the highest quality goods. When a few fibres are stretched they should recede to their original length. You may have observed that clothes made from ill-bred, non-elastic wool soon get out of shape and bulgy at the knees and elbows.
3. Soundness and freeness.—All combing wools must be strong and separate freely like a skein of silk, or there is so much waste or noils when they are passed through the combs that manufacturers cannot afford to give long prices.
4. Colour and lustre.—The wool should be bright and light-coloured, so as to be capable of receiving the most delicate and brilliant dyes. For alpacas and many other manufactures, lustre is indispensable.

I regret to say many of our finest wools are much injured by the Bathurst burr, which is rapidly spreading. Even in Virgil's time sheepowners had similar trouble:

> "Si tibi lanitium curæ, primum aspera silva
> Lappæque tribolique absint fuge pabula læta."

There should be an Act under which the Government would undertake to keep the roads and reserves clear of these noxious weeds and compel the landowners and Crown tenants to exterminate them from their holdings.

Sheep are sometimes annoyed with ticks, which are occasionally numerous enough to irritate the sheep into a feverish state, and destroy the silkiness and softness of the wool, discolour it, and fill the fleeces with their bodies, eggs, and filth. We have some simple and effectual dips which do not appear to injure the wool. The Romans used a complicated one as follows:—

> "Aut tonsum tristi contingunt corpus amurga,
> Et spumas miscent argenti vivaque sulfura,
> Idœasque pices et pinguis unguine ceras,
> Scillamque, elleborosque gravis, nigrumque bitumen."

In some parts of Scotland they smear the sheep with tar and butter to keep out the cold. The wool, however, suffers in value from this dressing to the extent of 25 to 35 per cent.

I should mention that a moderate quantity of yolk is essential for keeping the wool in a sound healthy condition. This yolk is a soapy matter, consisting of animal oil in combination with

potash and carbonate of potash. It appears to be produced in small glands for the special nourishment of the wool. Lincoln and Leicester wool contain only about 20 per cent., our Australian merino from 40 to 55 per cent., and German and Saxon wool from 55 to 75 per cent. The wool in box 14 would probably contain nearly 80 per cent.

The yolk is the best substance we know of for washing or scouring wool, leaving it in a soft and silky state, or what is known as good condition. Flockmasters who wash their wool would do well not to waste a single gallon of the water containing this valuable detergent. Some flocks from our arid western plains are deficient in yolk, and consequently in soundness and softness of wool.

The quality of wool varies on different parts of the body. The best is produced on the shoulder, and the worst on the breech. The perfection of breeding is to produce a sheep with a heavy fleece of good wool of even quality all over its body. I have been told that the French manufacturers spin 13 miles of yarn from one pound of our Mudgee wool.

Sometimes kemp, which is a white lustrous hair, about half an inch long, makes its appearance in the fleece. This kemp will not take a dye, and consequently wool containing it is unfit for the manufacture of the highest class of goods.

Uses of Wool.

I will now proceed to show you some of the uses to which wool is applied. The manufacture of our clothing is, without doubt, the most important. Mr. Vicars, the well-known tweed manufacturer, who has established a profitable industry here without protective duties, has kindly supplied some of the tweeds made at his factory from our colonial wools.

I am informed that much of our strongest wool is now bought for working up shoddy and jute. Our high quality wools are capable of taking very brilliant dyes, and you will observe by the patterns before you that the colours are as bright and as delicate as those of silks. Wools retain their dyes well, and it is only when other materials are mixed with the goods that they fade quickly.

Carpets take a good deal of the strong coarse wools. In the Brussels the weaving is done by using yarns of different colours to make the patterns; whereas in the tapestry carpets the yarn is printed in different colours, in a stretched position, and the pattern is brought out by the contraction of the yarn in weaving. The Kidderminster carpet is supposed to be all wool.

Our Australian merino wool possesses the quality of felting in a high degree, and is therefore well adapted for milled goods, broadcloths, &c. It is also made into fine felting for slippers, for hammer-coverings and other parts of pianos; hats of all kinds of pure wool or mixed with rabbit wool, shoddy, &c.

I am conscious I have done but scant justice to a subject in which we are all so very deeply interested, and the improved culture of which under an intelligent and progressive Government would rapidly place us in the position of the foremost Colonies of the world.

On the importance of a Comprehensive Scheme of Water Storage and Canalization for the future welfare of this Colony.

By F. B. Gipps, C.E.

[*Read before the Royal Society of N.S.W., 7 December, 1881.*]

When first the subject of a comprehensive scheme of hydrostatic and hydraulic engineering for this Colony suggested itself to me, I proposed to describe the physical, geological, and meteorological features of the country, and to design therefrom an elaborate scheme of water storage and canalisation. As however I proceeded in my task its difficulties became more and more invincible, owing to my limited knowledge of our river system. Sooner, however, than allow such an obstacle to deter me altogether from my purpose, I determined to initiate it under the above heading, trusting that the importance of such a scheme being duly appreciated might engage me the generous assistance not only of members of this Society but of all those who are patriotically interested in the welfare of their adopted country, whereby I might collect reliable data on which to found a safe base of operations. The importance of such a scheme on the industries and welfare of a country can only be fully realized by a careful study of ancient and modern history, and I shall therefore make no apology for commencing my paper by a liberal reference to their pages. Ruins of stupendous water-works are to be seen in the neighbourhood of the capitals of those ancient empires whose wealth and might excited the envy and terror of the world for centuries, but whose very sites are now only known to us through the pages of history, or by the desolate grandeur of their ruins.

The numerous remains of huge tanks, dams, canals, aqueducts, pipes, and pumps, in Egypt, Assyria, Mesopotamia, India, Ceylon, Phœnicia, and Italy, prove that the ancients had a far more perfect knowledge of hydraulic science than most people are inclined to credit them with. To this experience it seems to me may be attributed the construction of many of those monuments and temples immortalized by their gigantic and imperishable ruins, the astonishment and admiration of the ancient historian as well as of the modern traveller. I am partially warranted in this assumption by the fact that the Egyptians ran canals through their quarries, by which when filled by the inundations of the

Nile, they transported on rafts proportioned to their weight huge masses of stone for columns or obelisks to the positions they were required at, the whole country being intersected with numerous canals. Without doubt too the Egyptians, Chinese, and East Indians have from time immemorial raised water both for irrigation and turning mills, and it is therefore highly probable that, understanding its property as a motive power, they applied it in the construction of some of their magnificent temples. What but a skilful application of hydraulics could have raised those mighty columns of the Temple of the Sun at Baalbec, 21′ 8″ in circumference, 58 feet high, and weighing 272 tons, to their position 20 feet from the ground, or could have moved the column at the bottom of the neighbouring quarry 70 feet long, 14 feet broad, 14′ 6″ thick, weighing 1,130 tons. After a careful perusal of the records of history, it appears to me impossible to assert with confidence what particular nation originated the construction of reservoirs, canals, and water machinery. It is certain, however, that Egypt, India and China, followed by the Romans, were pre-eminent in ancient days for their skill in this branch of engineering science. The priests of Egypt believed that all things were composed of water, whilst Thales, the Milesian, taught that all things originated from water. The first artificial lake of which there is reliable record was called Lake Mœris. The historians Herodotus, Diodorus, and Pliny have described it, on the testimony of the inhabitants of the country, as one of the noblest works of the time, from its enormous dimensions, and its capacity for extensive irrigation for the benefit of mankind. According to them it was about 3,600 stadia, or 413 miles in circumference, and 300 feet deep. Two colossal statues on two pyramids raised their heads 300 feet above the lake and in the midst of it, whilst the foundations of these monuments were fixed on the base of the reservoir, 300 feet below the water-level. Modern travellers have considerably reduced the circumference and depth of this lake, making it measure somewhat less than 50 miles, but even with this curtailment it must have been a magnificent engineering work, worthy of the admiration of all ages. It was constructed, some historians say, by King Mœris, others by King Amenemhet III, in the 12th dynasty, 2084 years B.C. Its principal object was to regulate the inundations of the river Nile, with which it communicated by a canal about 12 miles long and 50 feet broad. When the inundation rose over 24 feet, and was likely to be disastrous to the crops, the sluices were opened and the flood was relieved, owing to their drainage through the canal into the lake; whilst when the Nile rose only 12 feet, and drought threatened the crops, the dearth was neutralised by the storage waters of the lake. As the Egyptians were so dependent on the inundation of the Nile for their welfare, even for their very means of livelihood,

they made careful observations by fixed measures of the height of its inundation, extending over a long series of years, from which it was ascertained that if the flood rose only 16 feet a famine was threatened, or if over 24 feet a disastrous flood might be anticipated.

An ancient historian thus bears record to the fertility of the Valley of the Nile:—"The same land bears in one year three or four different crops. Lettuces and cucumbers are sown first; then corn, and after harvest several sorts of pulse which are peculiar to Egypt. As the sun is extremely hot in this country, and rain falls very seldom in it, it is natural to suppose that the earth would soon be parched and the corn and pulse burnt up by so scorching a heat were it not for the canals and reservoirs with which Egypt abounds, and which by the drains from thence amply supply wherewith to water and refresh the fields and gardens. Words cannot express how rich their pastures are and how fat the flocks and herds grow in a very little time."

Sesostris, one of the most illustrious kings of antiquity, who reigned in Egypt 1491 B.C., was renowned alike for his conquests as for the grandeur of his public works. He had a great number of canals cut for the purposes of trade and irrigation, and is said to have designed the first canal which established communication between the Mediterranean and the Red Sea. This work was continued by Darius, who abandoned it because he was afraid that the Red Sea was higher than Egypt, and would therefore deluge the whole country, and it was finally completed under the Ptolemies. Irrigation canals are so numerous in Egypt, and irrigation is conducted on such an extensive scale, that it is calculated only $\frac{1}{10}$ of the water in the Nile which enters Egypt passes through to the Mediterranean Sea.

In a valuable little work called Monographs, Mr. F. S. Peppercorne, C.E., states that in the reign of the late Khedive (Ismail Pasha) upwards of one hundred new canals, great and small, have been constructed, and there are at present in the country no less than 756 non-navigable canals, or such as are used solely for irrigation, and 62 canals that are used both for irrigation and the transit of goods and produce, making a total in 1879 of 818 canals. Out of a cultivated area of $4\frac{1}{2}$ million acres, 2,500,000 acres are thus provided with means for irrigation.

The Assyrians were equally renowned with the Egyptians from the most remote periods of history for their skill and ingenuity in the construction of hydraulic works. Through the foresight, enterprise and energy of their rulers, perhaps largely impelled by motives of a worthy ambition to leave lasting monuments of their renown and patriotism, they converted the sterile country in the valleys of the Euphrates and Tigris into a fertility which was the

theme of wonder and admiration of the ancient historians. The country below Hit, on the Euphrates, and Samarra, on the Tigris, was at one time intersected with numerous canals; one of the most ancient and important of which, called the Nahr Malikah, connecting the Euphrates with the Tigris, is attributed by tradition to Nimrod, King of Babel, 2,204 B.C., whilst other historians assert that Nebuchadnezzar constructed it. The latter king is also by some considered the author of the most prodigious artificial lake ever constructed. It seems that during June, July, and August the volume of the river Euphrates increased so rapidly that it threatened to overflow its banks and cause considerable damage to Babylon and its neighbourhood, and it was therefore considered necessary to raise high banks on both sides of the river, built of brick, cemented with bitumen, to protect the city. To facilitate this purpose, a big lake was dug out 42 miles in circumference and 35 feet deep, into which the whole river was turned by an artificial canal. When the embankments were completed the river was restored to its original channel, whilst the lake served as a storage reservoir for collecting flood-waters and distributing them for irrigation. With the destruction of Babylon, the glory of the empire departed, the canals were neglected, and the country described by Herodotus as being prolific before all other lands in its production of corn, wheat, and barley has become so dry and barren that it cannot be cultivated. The principal canals supplied by the Euphrates were the Nahr Malikah or Fluvius Regius, the Nah-raga, the Nahr Sares, the Kutha, and Pallacopus. The Tigris supplied the Nahrawan and Dyiel, besides several smaller canals. The whilom great importance of the Nahrawan, both for commerce and agriculture, and its great antiquity, are testified to by the ruins of numerous towns and cities on both of its banks. It started on the right bank of the Tigris, where the river debouches from the Hamrine Hills, and flowed at a distance of six or seven miles from the river towards Samarra, where it was joined by a second conduit. About 10 miles further on it received a third feeder from the river at Gaim, and continuing its course it approached Bagdad. A few miles lower down it flowed into the Diyalah or Shirwan River, which was raised by a large band or weir to a sufficient height to allow of its continuance. It then proceeded through Kuzistan, absorbing all the streams from the Sour and Buckharee Mountains, and finally flowed into the Kerkha River. It was over 400 miles long and of immense dimensions, its width varying from 250 to 400 feet, and by numerous branches on both sides it irrigated a very extensive area of country, whilst at the same time it was available for navigation. Few, if any, hydraulic schemes of modern days equal in boldness of conception, this stupendous achievement of a generation of 4000 years ago. The present

irrigation canals deriving their supply from the Tigris, known as the Boogharaib, Massoodee Desodee Rithwammihi, and Mahmoudee, are very insignificant in comparison with the Nahrawan.

The remains of reservoirs in the neighbourhood of Hebron, which the Jews are said to have constructed in the days of Solomon, for the supply of Jerusalem, show that their designers were equally alive with most engineers of the present age to the great importance of an ample and constant supply of pure water. A large portion of the supply conduit consisted of earthen pipes cased with stones hewn out to fit them, which again were covered with rubble in cement, thus the coolness and purity of the water was perfectly preserved. The Phœnicians in the zenith of their power were celebrated for their canals, both for the supply of Carthage with drinking water and for the purposes of irrigation. Agathocles, the daring but unfortunate Syracusan general, who thought by his invasion of Africa to force the Carthaginians to raise the siege of Syracuse, left this record of his disastrous invasion, that "the African shore was covered with gardens and large plantations, everywhere abounding in canals, by means of which they were plentifully watered. The lands were planted with vines, palms, and many other fruit-trees, and the meadows were filled with flocks and herds." When the Romans invaded the Carthaginian dominions fifty years later, their historian Polybius drew a somewhat similar picture of their fertility and high state of cultivation. But undoubtedly the conduit which supplied Carthage with drinking water was their most notable achievement in water-works. It derived its supply from a spring about 60 miles distant from the city, and in its course cut through mountains by tunnels and crossed valleys by lofty and massive aqueducts, in one instance 125 feet high. It was 4 feet wide at the base and 6 feet high, closing at the top in the shape of a pyramid, and was sufficiently high for a man to walk in with ease. It was covered throughout, for sanitary reasons, and was constructed most substantially of masonry lined internally with cement, which has preserved it from the attacks of time so well that even now a large portion of it is used for the supply of Tunis, which derives its water from the same source.

The Grecians, judging from the ruins of large aqueducts scattered throughout their country, appear from a very remote period to have paid the greatest attention to hydraulic science. Herodotus describes an ancient conduit for supplying Samos, which had a channel 3 feet wide, and which pierced a hill with a tunnel nearly a mile long. Another masonry aqueduct near Patara crossed a ravine 200 feet wide and 250 feet deep. It was constructed of masonry in cement; the stone blocks 3 feet cube had a bore through the centre of 13 inches in diameter, and joints were formed similar to a spigot and faucet joint by the annular end of one end of a block fitting into

a recess of the opposite end of another block. The joints were secured by cement, and also by iron clamps run with lead. This aqueduct had a considerable depression in the centre, and appears to have been one of the first attempts to run water in an inverted syphon, proving that the ancient Greeks had a thorough knowledge of the principle that water will rise to the level of its source.

Italy, that land of genius, the birthplace of the mathematicians and engineers who revived hydraulic engineering in modern times, was also in ancient days the scene of some of the most magnificent water-supply schemes ever conceived or constructed. The Romans having vanquished all rival empires hastened to take advantage of the knowledge they had acquired in their conquests, and in the construction of numerous grand and beautiful public works, became renowned not only for their prowess in arms but also for their high appreciation of the arts and sciences. They appear to have been especially scrupulous as to the purity of their drinking-water and as to the cleanliness of their person. To ensure the first, they constructed the Aqua-Martia, which was covered throughout, and to encourage the last they built numerous baths. In the reign of the Emperor Nero, Rome was supplied by no fewer than nine large conduits, having an aggregate length of 255 miles, which delivered over 173 million gallons daily. Afterwards this supply was increased to 312½ million gallons daily, equal to a rate of 325 gallons to each inhabitant. The Aqua-Martia conduit which alone supplied the drinking-water was 16 feet in diameter and 40 miles long. One of the principal aqueducts it crossed is remarkable for the grandeur of its dimensions, and for the skilfulness of its construction. It had to sustain three large conduits, the Julia, Sepula, and the Aqua-Martia, and the greatest precaution was exercised to prevent the two first from draining into the lower one, and thus deteriorating its waters. Strabo, in alluding to the skill of the Romans in the application of hydraulics, remarks that not only were there subterranean conduits at Rome, but that all the houses had syphons or water-pipes which probably could be used to extinguish accidental fires. But besides excelling in their sanitary measures to deliver a pure and ample supply of water to their different cities, the Romans were equally renowned for their encouragement of trade, commerce, and agriculture, and for improving the salubrity of their country by the construction of numerous canals. Thus, they drained the Pontine marshes, and so improved the river system that, according to their historians, there was no river in Italy that was not made useful for the purpose of commerce and the transport of troops and provisions. Not content with thus developing the resources of their own country, they studied, wherever victory led the way, to improve the condition of the vanquished by similar public works. They constructed a series of large reservoirs

along the range of hills nearly bordering on the Black Sea, from which they supplied large covered cisterns in Constantinople with a pure and constant stream of water. In France they constructed conduits to supply Lyons, Frejus, Souy, Metz, and Nismes. The first, owing to the boldness of its conception and the skilfulness of its construction, and because it is one of the first known instances of the use of metal pipes subjected to any great pressure, is worthy of more than passing notice. It was designed especially for the purpose of supplying the palace of Claudius, situated in the highest part of the town. It was covered with an arch of rubble stones, faced with cement, internally, $1\frac{1}{2}$ in. thick. 2 feet from the base iron ties were inserted at intervals of 30 inches, to hold the side walls together and prevent outward pressure. The valley at the foot of the Soucien heights is very deep, and in order to avoid a high aqueduct the water was conveyed over in nine 8-inch leaden pipes in the shape of an inverted syphon, which rested on masonry piers, which afterwards conducted it to the palace. The Nismes conduit, constructed in the time of Augustus, B.C. 19, which delivered 14,000,000 gallons daily, is celebrated for a magnificent aqueduct called the Pont du Gard. Humber describes it as one of the grandest monuments the Romans have left in France or any other country. "It consists of three tiers of arches, the lowest of six arches supporting eleven of equal span in the centre tier, surmounted by thirty-five of smaller size, the whole constructed in a plain style of architecture. It is surmounted by the canal, shaped in section like the letter U, which is 2 feet wide and 5 feet high, and is covered at the top with large stone slabs, so that it can be crossed on foot." The masonry was so carefully fitted that even after the lapse of so many centuries it still spans the valley, and has been but little affected by the storms of time. Again, in Spain and Portugal they supplied the towns of Segovia, Seville, Evora, and Lisbon, by means of conduits of considerable length, which crossed deep valleys on aqueducts of great magnitude, which, however, present no very remarkable features worthy of further comment.

China is equally celebrated with Egypt for the great antiquity of its numerous canals. The Great or Imperial Canal is one of the most stupendous public works of ancient or modern times. It is 650 miles long, and connects the Hoangho and Yangtsze Kiang Rivers. Its depth is seldom more than from 5 to 6 feet, whilst in dry seasons it is considerably less. To regulate its fall it is provided with a number of solid wooden sluices, over which vessels are hauled by machinery and let down on the other side. It takes ordinarily forty days to navigate between the two rivers, the vessels being sometimes rowed, sometimes dragged. Its average velocity is $2\frac{1}{2}$ miles an hour, and in its course it crosses several large lakes on the top of enormous dykes. It is available both for navigation

and irrigation, and together with its numerous branches, irrigates an immense area of country, thus affording millions the means of livelihood and support.

Again, in the Malay Archipelago irrigation is carried out to such perfection as to excite the astonishment of the distinguished naturalist Mr. Wallace, who thus describes it:—"It was here that I first obtained an adequate idea of one of the most wonderful systems of cultivation in the world, equalling all that is related of Chinese industry, and, as far as I know, surpassing in the labour bestowed on it any tract of equal extent in the most civilized countries of Europe. I rode through this strange garden utterly amazed, and hardly able to realize the fact that in this remote and little known island, Lombock, from which all Europeans (except a few traders at the port) are jealously excluded, many hundreds of square miles of irregularly undulating country have been so skilfully terraced and levelled, and so permeated by artificial channels, that every portion of it can be irrigated and dried at pleasure."

Many ancient native writers testify to the high estimation entertained by the inhabitants of India for water supply for irrigation purposes. The "Vishnood" declares that "no satisfaction is felt without water in the three worlds, Heaven, Hell, and Earth; therefore a wise and learned man should cause reservoirs, tanks, and wells to be made." The Yama-poran teaches that "a person in whose pond or tank there is a constant supply of water obtains perpetual felicity without doubt"; and the Bhewish-Yotara-poonan exclaims: "O thou son of Koonti, get large supplies of water made at the sacrifice of your whole property, for the man at whose reservoir the cow slakes her thirst becomes the preserver of his family."

Immense tanks or reservoirs and irrigating canals appear to have been constructed in India many centuries anterior to the advent of Christ, and some of them are probably equally as ancient as the Egyptian canals. The Cummin tank in Madras has an embankment 102 feet high, and of considerable length. The Naggar Sulikerrai has an embankment 84 feet high and 603 feet wide at base, which encloses an area of about 40 square miles. In Bombay the Lachura tank is about 3 miles in circumference. In Ceylon the Mincheri tank forms a beautiful lake of over 20 miles in circumference. The Kalavara tank is about 46 miles in circumference, and is formed by an embankment 12 miles long across the Kalaoga River. The Kalucarri tank forms a lake 60 miles in circumference by an embankment 15 miles long, and 300 feet wide at base. Many of these immense embankments consist only of well-trodden clay resting on the surface of the ground, and are constructed without the application of any particular engineering skill, no puddle walls having been used to render them more water-tight,

With this brief allusion to the ancient tanks of India I shall conclude my descriptions of the celebrated water-works of antiquity, which, as noble monuments of the skill, patience and perseverance of their architects and constructors, merit our highest admiration. The precaution of the ancients in covering conduits that supplied drinking-water proves that they were fully impressed with the importance of such construction as a sanitary measure to preserve the coolness and salubrity of the water, whilst their construction of numerous irrigation and navigation canals indicates their thorough appreciation of such works for the development of their commerce and industries.

The revival of hydraulic science in modern history may be said to have commenced in Italy about the tenth century, when several large canals were constructed for irrigation purposes, which later on were modified so as to combine navigation. In the 15th century Leonardo da Vinci introduced locks and sluices for the retention of water in the Paduan Canal, and by this means he succeeded in uniting the two navigable canals of the Adda and Tesino. This discovery was soon taken advantage of in France, especially in the construction of the Languedoc Canal, which even in the present day is considered one of the most gigantic enterprises constructed on the lock system, and pre-eminent in the skill and science displayed in its construction. It was designed by Andreosi, partially executed under Riquet, and was perfected and completed by the celebrated military engineer Marshal Vauban, for a total cost of nearly one million pounds sterling. Its average breadth is 60 feet, its depth 6½ feet, and its length 148 miles. Its summit level is at a lake 4 miles in circumference, and 600 feet above sea level, whence the waters are distributed to the right until they meet the Garonne near Toulouse, and to the left as far as the lake Tau, which is near the port of Cette in the Mediterranean. In its course it crosses mountains and valleys by deep excavations, tunnels, and aqueducts, and ascends 600 feet, and falls again almost to sea-level by no less than 114 locks and sluices. Its great importance may be imagined from the fact that it shortens the navigation between Bourdeaux and Marseilles by nearly 2,000 miles. The Canal du Centre is another national work reflecting great credit on its engineers. It is 48 feet wide at water-level, 5½ feet deep, and 72 miles long. It unites the Saône and Loire Rivers, and its summit level is 240 feet above the sea. France boasts now of seventy-four navigable canals, traversing an aggregate distance of 2,280 miles, besides several irrigation canals in the Southern Provinces.

The principal navigable canal in Italy is named Navilio Grande. Deriving its source from the Tesino, it connects Milan with the Lago Maggiore on the one hand, and with the sea on the other hand, through the river Po. Though constructed over a century and a half ago, it is still considered as a model of engineering skill.

The plains of Lombardy are intersected by no fewer than twelve large canals, many of which are navigable and have numerous branches. Their chief object was, however, to develop by means of irrigation the great fertility of both banks of the Po. Numerous water ditches trending along the terraced sides of the mountains irrigate the plains of Tuscany, in the neighbourhood of Florence; unfortunately I cannot obtain any information as to the results of their application. Returning to the north, one of the most recent irrigation schemes deriving its source from the Lago Maggiore, owing to the reliable statistics supplied by Mr. Jackson, C.E., of its character, cost, and returns, merits especial attention as affording some basis on which we may estimate the advantages of such canals in this country. Its main canal, which is 30 miles long, has a sectional area of 604 square feet, and was constructed at a cost of £215,516. The whole scheme, embracing besides the main canal two large canals, 14¾ and 18¼ miles long respectively, and numerous secondary canals of an aggregate length of 132 miles, and all headworks, &c., cost £880,000. Its returns per annum average about £60,245 for irrigation, £12,000 for navigation, and £3,755 for motive power and other uses, which give a total of £76,000, whilst its maintenance costs only £10,000 per annum, so that its clear profit is £66,000, which represents 7½ per cent. interest. It is estimated that in forty years it will return £1,280,000, which will cover the cost of its construction and maintenance. It was executed by a small company of local shareholders in 1872, for the purpose of irrigating a very dry tract of land embracing 216,234 acres, which supports a population of 459,166. The country has a general uniform fall of ·75 of a foot from west to east, and of ·20 of a foot from north to south. Even the most sandy soil admits of irrigation with good effect as pasture land.

The profit per acre is estimated as follows:—

	Cost of water.	Expenses on land.	Total.	Value of increase of produce.	Profit per acre.
				£ s. d.	£ s. d.
For sandy soil	10/8	6/3	16/11	2 8 6	1 11 7
For clay soil	7/5	6/3	13/8	2 0 7	1 6 11
Mean.................	9/	6/3	15/3	2 4 6	1 9 3

The indirect advantages of irrigation are also considerable, as it reduces the labour of ploughing, hoeing, and harrowing.

The complete scheme will irrigate 190,690 acres with 2,472 cubic feet per second out of the 2,825 cubic feet of full supply. At the same proportion it would irrigate, together with its remaining supply of 353 cubic feet, 217,930 acres, or 340 square miles, at a cost of about £2,600 per square mile.

The kingdom of the Netherlands for its size contains a greater number of navigable canals than any. They were commenced partly for drainage, partly for navigation, as early as the 12th Century, and proved of especial advantage to Flanders, which, by their means became the entrepôt of the commerce between North and South Europe. At present they permeate the country in every direction, and have led to an enormous trade between Holland and every part of France and Germany. The yearly profits of the canals is estimated at £625 per mile. They are generally 60 feet wide, 6 feet deep, and are nearly level. Their banks are very thick, as they are the great drainage arteries of the country, and any breach might lead to the most disastrous consequences from inundation of the network of channels at the mouth of the Rhine. The principal canal flows from Amsterdam to Niendiep, and is considered one of the greatest works of its kind in the world. It is 50½ miles long, 124½ feet and 36 feet broad at water-level and at bottom respectively, and its average depth is 20¾ feet. It has only two tide locks, one at each extremity, and was constructed for £1,000,000.

Denmark, for the encouragement of commercial enterprise, constructed the celebrated Holstein Canal, which provides communication between the North Sea and the Baltic. It is 26 miles long, inclusive of 6 miles of river navigation; 95 feet wide at water-level, 51½ feet at bottom, 9½ feet deep, and is navigable for vessels of 120 tons. It cost £500,000.

A large proportion of the Russian trade is dependent on the extensive communication of the seaports with the interior of the country by means of rivers and canals. Merchandise and all kinds of country produce are conveyed from St. Petersburg to the Caspian Sea, 1,434 miles, by water passage, whilst the iron and furs of Siberia and the teas of China are even now to a certain extent conveyed to St. Petersburg through a similar channel.

England has no less than 2,300 miles of canal and 1,800 miles of river navigation; by means of which the opposite shores of the Kingdom are united, and all the principal rivers connected with one another. English navigable canals received great impetus by the construction of the Duke of Bridgewater's canal in 1761. This grand enterprise nearly received a coup de grâce at Barton, on the Irwell River. Mr. Brindley, a self-taught engineer, who designed and constructed it, proposed to cross the river by an aqueduct 39 feet above the surface of the water, but the proposal was scoffed at, and regarded as wild and empirical as the Kenny Hill scheme for Sydney water supply. An eminent authority of the day when he saw the spot exclaimed—"I have often heard of castles in the air, but never was shown before where any of them were to be erected." Notwithstanding the formidable array of

professional opinion against the plan of his engineer, the Duke fortunately followed it, and his confidence was fully justified by its successful completion. The length of this canal is 29 miles, and in its course it traverses a very difficult country.

In Scotland, the Caledonian and Forth and Clyde Canals have proved highly advantageous to internal traffic, and have served to shorten the coasting traffic in stormy seas for several hundred miles. The first, surveyed by James Watt in 1773, has a total length of 60½ miles, which includes 37½ miles of lake navigation, and connects Inverness on the east coast with Loch Eil on the west coast. Its summit level at Laggan is 102 feet above sea-level. It is 120 feet wide at water-level, 50 feet at bottom, and 20 feet deep. The Forth and Clyde Canal connects Edinburgh with Glasgow. Its total length, including collateral branches, is 38¾ miles; its width, 56 feet at top, 27 feet at bottom; its depth 8½ feet, and its summit level 150 feet above the sea. Some few years ago it was proved on this canal that it was practicable to impel a large passenger and goods boat at the rate of 10 miles an hour without danger to the banks.

The two principal Irish canals, called the Grand and the Royal, are noted more on account of their enormous cost than for the engineering skill exhibited in their design and construction. The Grand Canal connects Dublin with Limerick, has a total length of 164 miles, including its branches; it is 40 feet wide, 6 feet deep, and its summit level is 164 miles above the sea; its cost was £2,000,000 sterling. Mr. Wakefield declares that the Company who constructed it sank more money in carrying it through the Allen bog than would have cut a spacious canal from Dublin to Limerick. The Royal Canal is 92 miles long, and 24 feet wide at bottom; and its summit level is 322 feet above the sea. Its cost was over £1,500,000.

In Canada the English Government have constructed for military purposes the Rideau Canal connecting Lake Ontario with the river St. Lawrence through the Ottawa, and the Welland Canal uniting Lakes Erie and Ontario.

The Americans have exhibited the same restless energy and enterprise in the construction of canals as in their various other undertakings. The aggregate length of their canals is about 6,000 miles, more than half of which is confined to the three States of New York, Ohio, and Pennsylvania. The Erie Canal, which unites Lake Erie with the Hudson River, is 363 miles long, 70 feet wide at surface level, 42 feet at bottom, 7 feet deep, and its summit level is 292 feet above the sea. Its cost was about £5,000,000 sterling. In the State of California irrigation is largely resorted to, on account of the small average rainfall, and with surprising profit. According to the State Surveyor General's statistics for 1871, California could boast of 915 irrigating ditches,

supplying water to 90,344 acres. Experience quickly showing the great advantages of this system, which from 20 acres produced in some instances as much as 2,000 acres had yielded without irrigation, has since led to their construction on a much larger scale.

The San Joaquim and King's River Canal and Irrigation Company's canal irrigates over 15,000 acres, and when its extension to San Joaquin city is completed it is estimated that it will irrigate 325,000 acres, which at 20 bushels of wheat to the acre (a low average for this valley) would produce 6,000,000 bushels of wheat from ground which before hardly produced 60,000 bushels. In 1875 this canal was 38½ miles long, 55 feet wide, 4 feet deep, and had a fall of 1 foot to the mile. It was then proposed to extend it 40 miles, with a grade of ½ foot to the mile. The King's River Irrigation Company's Canal is 30 feet wide, 3 feet deep, and has a fall of 1 foot to the mile. The supply is considered sufficient for irrigating 300,000 acres. The Fresno Canal is 10 miles, 40 feet wide, and has a grade of $\frac{8}{10}$ foot to a mile; it is supplied from a reservoir 1½ mile long, 100 feet wide, and 10 feet deep, and is estimated to irrigate 40,000 acres.

Chapman's Canal taps the San Joaquin River just above a great bend, and runs nearly parallel with the river below the bend; it is 30 miles long, 35 feet wide, and 3 feet deep, with 1 foot grade to the mile; it was estimated to irrigate 50,000 acres, and most of the land covered by it belonged to its three builders. Besides these irrigation ditches there were, in 1871, no fewer than 516 minor ditches, having an aggregate length of 4,800 miles, supplying 2,000 million gallons daily. There are also numerous large ditches constructed, at a cost of over £3,200,000, by different large Companies employed in hydraulic sluicing the celebrated Blue Lead and other deep gravel drifts on the western flank of the Sierra Nevada Mountains. Some of these evidence considerable skill and ingenuity in their design and construction, having been taken across a very difficult country intersected in places by deep and almost precipitous gorges. The vast influence of these ditches in developing the hidden wealth of the deep drifts may be imagined from the fact that one ditch alone in Todd's Valley secured a return of 16,000,000 dollars of gold-dust, whilst Slate Creek workings in 1872 had returned over 70,000,000 dollars of gold dust. Another hydraulic company washed 224,000 cubic feet of dirt in six days, with a water supply of 4,000,000 gallons, though the dirt only contained about one farthing's worth of gold to the cubic foot; and though the cost of wages and water was very high they realized a profit of 2,350 dollars—a proof of what a small quantity of gold will return in such deep drifts by a skilful application of hydraulic power.

Here let me pause in my brief and hurried review of the grand monuments of the past skill, industry, and enterprise of different

great nations of ancient and modern history, and before proceeding let me ask you to take a swift glance behind. The vista presented to your gaze is indeed pregnant with reflections sad and melancholy, as you look on the distant scene of departed grandeur, but gratifying enough as you look nearer the halting ground—as you see how by the light of modern hydraulic science the health, comforts, and necessities of so many more millions have been administered to through so many varied channels. In the distant horizon far beyond the Pyramids you see immense lakes and canals constructed for the purposes of irrigation, commerce and defence, fostering nay it might almost be said preserving great empires. Two thousand years later you see the Roman Empire in the full blaze of its glory, nobly striving to preserve its reputation, not only by the deeds of its victorious armies, but by the construction of massive and enduring public works which should be lasting monuments of their high endeavours to secure the health and welfare not only of their own people but of all their subjects. Two thousand years later in the foreground you see most of the powerful nations vieing with one another in inventing machinery to which water may be applied as the motive power in adapting it on a far larger scale to irrigation and navigation purposes, and in supplying it in its purest condition to the different centres of population, whilst we have much greater wonders to anticipate from its application as a motive power to electrical machines.

Such a scene reminds me of an eventful page in the history of bygone days when, at the close of the Indian mutiny, I gazed on the thin stream of the English army headed by its noble chiefs, the talented and kingly Canning, and the fiery gallant Clyde, threading its way through the battle-riven town of Lucknow, through an avenue of princes, kings, and emperors, blazing with jewelry and all the splendour of Eastern dress, whilst far as the eye could reach their retinues were massed to join in doing homage. In this scene too there was scope enough for diverse reflections. The vast multitude represented the remnants of Empires whose glory had departed from them, distinguished in their time for mighty deeds of arms and wonderful works of art, whilst the progress of advanced civilization was represented in that thin stream of British soldiery, who had conquered, but with the intention of adding untold blessings to the oppressed millions of their new subjects. How nobly they have performed their duty the accompanying abstract of statistics of some of the principal canals may in some measure serve to realize to you.

Having thus briefly pointed out the important relation of storage reservoirs and canals to the rise, progress, and prosperity of the different nations in the world, more especially in ancient times, let me invite your attention to a few suggestions for applying to our own adopted country those great lessons taught us

by the experience of ages, which I earnestly trust may not only meet with your approval, but may engage your hearty co-operation to carry into effect. As a preface it is necessary to consider the river system of New South Wales, which has peculiarities not to be met with in the old world. For instance, the coast district, which has a varying width ranging from 10 to 70 miles, is watered by rivers which, having their sources in the lofty mountains of the dividing range of silurian origin, generally in their short courses rush down in swift torrents, cutting the sandstone strata into deep ravines till they reach within a few miles of the coast, where they become navigable. This region seldom requires irrigation, the rainfall being sufficiently ample and constant to provide for all the requirements of cultivation. On the contrary, the rich plains which generally extend for some distance near their mouth require protection from the heavy floods which sometimes devastate them, impoverishing the settlers by bearing away with them the fruits of many years' labour. The rivers on the western flank of the dividing range, however, on debouching from their mountain passes, flow through immense plains which offer every inducement, on account of the fertility of the soil, for a well-designed scheme of navigable and irrigating canalization. The principal rivers on the eastern flank of the dividing range, falling into the Pacific Ocean, range to the following lengths:—The Hawkesbury, embracing the Nepean and Wolondilly, 330 miles; the Hunter River, 300 miles; the Shoalhaven, 260 miles; the Clarence, 240 miles; the Macleay, 190 miles; the Richmond, 120 miles; and the Manning, 100 miles. The Towamba, Bega, Tuross, Moruya, Clyde, Karuah, and Hastings Rivers are all under 100 miles long, and are only navigable for short distances by small craft, owing to dangerous bars.

The entrances to all the larger rivers are more or less dangerous to large shipping, owing to their shifting bars, so that any inland navigation scheme which would lessen this danger should commend itself to careful investigation. Having travelled but little on the coast, and having had but little opportunity for collecting information on it, the only proposition I can at present suggest is the cutting of a navigable canal through the Myall and Wallis Lakes up along the coast to the Manning River, by which communication in a direct line would be opened up for upwards of 100 miles with the splendid harbour of Port Stephens, whilst a short railway thence to Newcastle would complete the link joining that port with the proposed railway to Sydney. There do not appear to me any great engineering difficulties in such a scheme, and I believe, if properly matured, it could be carried out for a sum which would shortly be recouped by the high prices township land would command at the terminus of the navigation in Port Stephens.

The great rivers of the western watershed of the Great Dividing Range are the Darling, Lachlan, Murray, and Murrumbidgee. The Tumut, a tributary of the last, is 80 miles long; whilst the Namoi 600 miles, the Bogan 450 miles, the Gwydir 445 miles, the Barwon 510 miles, the Castlereagh 365 miles, the M'Intyre 350 miles, the Macquarie 750 miles, and the Warrego 100 miles in length, are all tributaries of the Darling, which itself flows into the Murray 300 miles in a direct line below Albury. The Murray, with its various feeders and tributaries, draining a basin of fully 500,000 square miles, may be ranked with the large rivers of the world, and must at some future time exercise the most important influence on the destiny of this Colony. In itself it is 1,120 miles long, of which distance 1,030 miles are navigable in ordinary seasons; whilst the Murrumbidgee, which joins it about 220 miles below Albury, is navigable for over 700 miles, and the Darling River is navigable for over 1,700 miles. In dry seasons it is estimated that over 2,000 miles are lost to navigation between all three rivers, and yet there is a sufficiency of rainfall to ensure with proper storage and distribution a much longer stretch of navigation in the driest seasons than is estimated for the most favoured seasons now. The large fertile plains of the interior which these rivers traverse would, by a well-devised scheme of constant irrigation, offer the most promising fields for the establishment of a sturdy independent class of yeomanry farmers, for which England is so justly celebrated, and who are the very backbone of any nation. They would stimulate internal trade, which is of far more consequence than foreign trade, which any war would interrupt and endanger; and in developing our own resources they would render us much more independent of other nations, from whom we derive now almost all the necessaries and luxuries of life. I am too little acquainted with the physical features of the watersheds of these rivers to presume on suggesting any design for irrigating canals at present; but that the advantages of such a system may be justly appreciated, I will suppose that a scheme similar to the Lago Maggiore could be applied to the Liverpool Plains, a very fertile tract of 10 million acres. At the ratio that the irrigation of 216,000 acres would support a population of 459,000 as by the above scheme, the Liverpool Plains would support a population of 21 millions, and would return a clear profit per annum, at £1 9s. 3d. per acre, of £14,625,000. The tract of country between the Lachlan and Darling Rivers, which is far more extensive, would support over 100 million people.

Again, for every sheep which is now kept with a certain amount of risk, on account of frequent droughts, judging from the experiences of Southern California, at least ten could be fed in luxuriant pastures regardless of seasons, so that the increase in our wool production would be something enormous, far beyond the capabilities

of the present condition of the country even after a succession of favourable seasons. As a valuable auxiliary to irrigating canals it would be well to take into consideration the storage lakes which, at little expense for low dams, could be constructed along the banks of the different rivers, and of which Lake Cudgellico offers an excellent example. Here a large sheet of water, formed by the overflow of the Lachlan River, is retained by a low dam; and, judging from the frequent large marshes along the banks of other rivers as shown in maps, this instance might be multiplied many times.

But the high prices claimed for land required for public works will be a potent obstacle to the carrying out of any system of canalization, unless the present mad race to alienate the public property is stayed, or unless a clause is introduced in the Land Act providing that in the event of Government alienating any land for railways or canals it shall be able to redeem such lands for the selling price, or if preferred, by the purchaser, shall make good the area required elsewhere in the neighbourhood. But it seems to me that in order to secure the full advantages of future improvements to the public, it would be preferable to stop land sales altogether, and instead to issue long leases for unoccupied lands; at the same time introducing a sturdy class of labourers on them under promise of steady employment on productive works such as canals, for a certain number of years, to be followed by grants of from 20 to 40 acres on long lease along the line of such public works where cultivation was practicable, on condition that the cumulative rents of such leases should be deducted in small weekly sums from their wages, so that they would take possession of their blocks free of any charges for the term of the lease, whilst pastoral blocks of far larger area should be similarly leased for wool-growing. Such a disposal of the public property would foster the settlement of a large population in the interior, which would necessarily largely develop internal trade, whilst it would allow of any public works being constructed without constantly dipping into the public purse for monstrous land claims, and when the lease lapsed the property would revert to the public at a greatly enhanced value. My experiences in Southern California, during a visit of many months, convinced me of the great importance of irrigation, both in developing the revenue and resources of a country and in increasing its population. There is a country which, I suppose, judging from its almost treeless and barren appearance, the great scientist Humboldt predicted would become before many centuries a desert like unto the Colorado on the eastern slope of the Coast Range, and yet owing to the irrigation schemes of different companies, and to the division of the large sheep ranchos into small farms, ranging from 20 to 100 acres, the country when I left was becoming covered with small cultivations, which supported a happy, thrifty and rapidly increasing population.

One gardener assured me that he realized a yearly profit of 2,000 dollars off 2 acres, whilst another paid off the whole cost of his farm of 40 acres with the proceeds of the first year's crops. The value of land increased so rapidly that some of the irrigation Companies realized enormous profits on the purchase price of it, and derived besides an unfailing large income from the sale of water. In the San Joaquin Valley a tract of 1,000 acres of flat sandy country, which would in its natural state barely support one sheep to the acre, was rendered so fertile with irrigation, combined with cultivation, that when sown with alfalfa, a species of lucerne, it fed no less than twenty sheep to the acre. In the same valley, as noticed above, it was estimated that a large district considered previously worthless for tillage would, by means of a large irrigating ditch, produce 6,000,000 bushels of wheat yearly. These are startling figures, and prove undeniably what little chance our farmers have and will have in competing with such a granary unless we strive immediately to provide some remedy in the development of our river system and tax the import of grain. Independently of the advantages of irrigation and navigation which such development would ensure, our mining fields offer in themselves sufficient inducement to encourage us to proceed with it. Hydraulic mining has been hardly introduced here, and yet, owing to its great economy, it must shortly attain considerable importance. According to Professor Silliman's investigations in California, it took 17,074,758 cubic yards of water to wash 989,165 cubic yards of gravel by hydraulic sluicing; at which rate 3,486 gallons would wash 1 cubic yard of gravel, or 3½ million gallons would wash 1,000 cubic yards, which is about the average quantity sluiced away by a first-class hydraulic mine per diem. From this calculation some impression may be formed of the grand results which may be anticipated from a skilful application of even a small reserve of the waste waters which rush down the Snowy and Tumut Rivers to the deep gravel drifts of Kiandra; for supposing the average depth of these drifts to be only 90 feet, and the average yield only 3 grains per cubic yard, then every 10 acres would yield 9,075 ounces of gold, worth £44,031 5s. These drifts extend for miles on miles along the dividing range of the Tumut and Snowy Rivers and its numerous spurs, and I am informed wherever tried have proved highly auriferous. Here, therefore, mountains of wealth may be truly said to exist, only awaiting the application of a sufficient and constant supply of water under pressure through an hydraulic nozzle to be properly developed. Again, gravel drifts of similar character extend for many miles along the banks of the Shoalhaven, Turon, and several other rivers, which by the same means could be forced to disgorge their hidden wealth. In the vast undeveloped wealth of our mines, and in the immense area of

our rich pastoral and agricultural land, there is therefore every inducement, nay, it behoves us as a duty to futurity, to elaborate a comprehensive scheme of water storage and distribution. But the collection of data for such purpose is a matter of great magnitude, and must necessarily involve long and patient study; in fact, it should be entrusted to a committee rather than left to the limited range of one member's observations and conclusions. It will be necessary to examine from carefully compiled maps the watersheds of all the principal rivers, especially noting the positions offered by the favourable physical features of the country for the impounding of large basins of water at a small comparative expenditure; and these positions should then be personally examined and notes taken as to their adaptability for storage reservoirs, their probable area, and the amount of water they would impound; to ascertain as approximately as possible the average rainfall on the watersheds and over the whole basins of the rivers; to ascertain from careful observers living on different sections of each river its water-carrying capacity in all seasons, also the maximum and minimum height of the water at the head of any such section, and in case of floods what area of land is covered with water; to propose plans by which the carrying capacity of each river may be increased or floods may be prevented, which will include its divergence into navigable and irrigating canals; and lastly, to have careful observations taken of the temperature and evaporation of all large reservoirs; for though Mr. Moriarty, adopting probably the result of observations of the Meteorological Society as epitomized by Humber, asserts that on such a deep capacious basin as the Prospect Reservoir little or no evaporation will ensue, yet the careful observations of Mr. Conybeare, C.E., on the actual amount of evaporation from the Vehar Lake, Bombay, which is 80 feet deep, and impounds 10,800 million gallons of water, proves that there is a clear loss from that source of 1,000 million gallons a year, or at the rate of 6 inches per month, for the eight dry months of the year. In view of the great importance of such a scheme, and its vast influence on the welfare of future generations, I would suggest that Government should be petitioned to locate by careful survey the position and acreage of all public lands in the different river valleys which could be subjected to irrigation from any main canal, to divide these lands into districts, and to devise a general scheme for their irrigation from such canal.

It is only through reliable information on the above subjects that any one can hope to design and elaborate a practicable and comprehensive scheme for water storage and distribution. The object of such a scheme must be to combine as far as is practicable, irrigating with navigable canals, as the advantages of such a combination are of the highest importance. An irrigating canal

serves to develop the internal resources of the country, in the impetus it gives both to pastoral and agricultural pursuits; whilst a navigable canal, according to Macpherson, "gives fresh life to established manufactures and encourages the establishment of new ones, by the ease of transporting the materials of manufactures and provisions. They invigorate and in many places create internal trade which, for its extent and value, is an object of still more importance than foreign commerce, and they greatly promote foreign trade, and consequently enrich the merchants of the ports they are connected with, by facilitating the exportation of produce from and the introduction of foreign merchandise into the interior ports of the country, which are thus placed nearly on a level with maritime ports, or, in other words, the interior ports become coasts and enjoy the accommodations of shipping." With the combination of irrigating and navigable canals it may therefore be justly prognosticated that a new era of prosperity will dawn on this country of much greater endurance than can possibly be anticipated under present conditions.

APPENDIX.

STATISTICS OF INDIAN CANALS, COLLECTED FROM JACKSON'S AND OTHER ENGINEER'S WORKS.

Name of Canal.	Source of Supply.	Length, including Branches, &c.	Width in feet.	Depth in feet.	Fall in feet per mile.	Discharge per second.	Acres irrigated.	Outlay.	Revenue.	Interest.	Working Expenses.	Percentage of Profit and Loss.
	Rivers.					cu. ft.		1877–1878.	1877–1878.			
Ganges.....	Ganges	4,010	140–110	10–8	1·5	6,750	1,045,013	3,055,015	275,462	127,192	105,462	1·51
Western Jumna	Jumna	415	360–120	4¾–2½	...	...	507,974	575,921	141,000	19,474	37,516	19·42
Eastern Jumna	,, ...	748	....	......	...	...	206,732	261,235	81,401	10,428	23,027	20·68
Boree Doab......	Ravi	1,185	120–112	4¾–2½	...	3,000	266,995	1,537,990	93,876	67,955	50,240	–1·62
Agra..............	Jumna	453	140–70	10–7	...	2,000	163,634	804,479	3,709	32,215	8,319	–5·14
Dun	Small streams	66	....	......	...	...	13,202	62,452	5,196	2,727	2,539	–·12
Sirhind	Sutlej	530	B. 200	28–10	...	4,500	783,000	1,537,990	......	53,077	.....	–4·5
Upper Sutlej and Chenab.	,, ...	223	60–20	6–3	...	...	94,621	56,812	8,362	2,322	11,307	–10·19
Lower Sutlej ...	,, ...	690	....	......	...	...	284,680	10,808	21,883	486	16,370	46·59
Orissa*	Mahanaddi	228	160	7	...	...	183,000	1,778,090	4,549	74,591	20,762	–5·48
Sone	Sone	331	B. 180	9	...	..	241,990	1,908,504	5,090	68,461	11,543	–4·92
Shahpur and Shahiwal.	Jhelum ...	36	18–10	6–4½	...	...	4,445	3,757	625	95	522	·35
Tambaddra† ...	Tambaddra	195	T106–90B	9–8	·3–·5	3,000	183,300	1,708,211	......	......	......	......
Punjab...........	Indus	618	....	6–3	...	...	180,137	57,547	22,140	2,589	19,001	·95
Sind .... Shahadadpur ... Sukkur	,, ...	428	....	......	...	...	171,465	126,081	20,722	5,265	......	4·59
Eastern Nara ...	,, ...	214	206–20	16–4	...	...	194,803	323,881	17,961	12,610	......	1·91
Mutha	Mutha	140	....	......	...	450	5,361	584,956	2,514	17,097	......	-3·5
Krishna	Krishna ...	45	....	......	...	382	2,934	89,016	1,198	5,189	......	–3·4
Godavari.........	Godavari ...	882	225–114	8–21	...	...	about 1,000,000	787,778	163,328	33,140	35,837	12·94
Kistna...........	Kistna	611	230–200	8	...	...	470,000	484,590	91,094	20,861	24,603	9·8
Pennair	Pennair......	200	....	......	...	...	70,000	134,020	......	6,031	......	–4·5
Vellore	Vellar	...	....	......	...	...	224,219	25,300	......	1,139	......	–4·5
Palar	Palar	...	....	......	...	...	37,672	108,371	2,102	4,877	1,012	–3·5
Cauvery	Cauvery ...	646	....	......	1·5	1,637	796,968	133,964	116,071	6,028	1,120	81·30

* Protects from inundation 249,000 acres.

† Seventeen locks for 368 feet fall.

PROCEEDINGS.

PROCEEDINGS

OF THE

ROYAL SOCIETY OF NEW SOUTH WALES.

WEDNESDAY, 4 MAY, 1881.

ANNUAL GENERAL MEETING.

Hon. Professor SMITH, C.M.G., President, in the Chair.

About seventy members were present.

The minutes of the last meeting were read and confirmed.

The Annual Report of the Council was then read, as follows:—

"In presenting their Annual Report, the Council are happy to state that the affairs of the Society are in a prosperous condition. The number of new members elected during the year was thirty-six; two names were restored to roll, the Society lost by death seven members, by resignation seven, and two had to be struck off the roll for non-payment of the annual subscription, thus making the actual increase twenty-two, and the total number of members on the 30th April, 1881, 452.

One honorary member was elected during the year, Sir Joseph Dalton Hooker, K.C.S.I., C.B., M.D., F.R.S., Director of the Royal Gardens, Kew, thus completing the limited number, twenty. The following gentlemen were elected corresponding members, viz.:—Mr. Hyde Clarke, V.P., Ethnological Institution, London; Major-General Sir Edward Ward, K.C.M.G., R.E., formerly one of the Honorary Secretaries of the Society, and Mr. F. B. Miller, F.C.S., of the Melbourne Mint: making the total number of corresponding members four. The Society's Journal, vol. XIII, for 1879, has been duly distributed to all the members entitled to it; and it is hoped that vol. XIV will be ready shortly.

The Council have the pleasure to announce that the dies for the Clarke Memorial Medal have been received from Messrs. J. S. and A. B. Wyon, London; and that, after payment for the same, there remains a balance of £209 14s. 3d. standing to the credit of the Clarke Memorial Medal, which has been placed at fixed deposit in the Oriental Bank, bearing interest at the rate of 4 per cent. from the 11th December last. At the Council meeting, held on March 31st, it was unanimously resolved to award the Clarke Medal for

the year 1881 to Professor M'Coy, F.R.S., of the Melbourne University, for his distinguished researches in the palæontology of Europe and Australia.

During the past year the Society has received 749 volumes and pamphlets as donations, amongst the most valuable of which are twelve parts of the Philosophical Transactions of the Royal Society of London. In return, this Society has presented 1,013 volumes to various kindred Societies, as per accompanying list. The report upon the Microscopical Cabinet shows that fourteen slides have been added during the past year, making a total of 214. The Council has subscribed to thirty-six scientific journals and publications, and has purchased several works of reference, a list of which is also appended. During the year the Society has held eleven meetings, and three of the Sections have held regular monthly meetings.

During the past year the house of the Society has been put into thorough repair, and has been repainted and decorated throughout; various alterations have been made in the rooms, which it is hoped will add greatly to the convenience and comfort of the members. The amount thus expended is £465 9s. 10d. The amount now standing to the credit of the Building Fund is £318 15s. 7d., of which the sum of £110 5s. has been collected since the last list published in June, 1880. The Council has very much pleasure in reporting that several members of the Society have promised to contribute annually towards the Building Fund until the present debt is paid off.

The Society's financial affairs are in a satisfactory condition; the cash balance is but small, on account of the unusual expenditure (£182 16s. 1d.) which it has been necessary to incur for furniture and other similar matters, consequent upon the changes made in the building. On the 31st July, 1880, the Academy of Arts tenancy expired, so that the Society has no longer this source of revenue to look forward to.'

The following Financial Statement for the year ending 30th April, 1881, was presented by the Honorary Treasurer :—

GENERAL ACCOUNT.

Receipts.	£	s.	d.	£	s.	d.
To Balance in Union Bank, 30th April, 1880 ...				38	10	3
,, Subscriptions and entrance fees, from 1st May, 1880, to 30th April, 1881	605	2	1			
,, Government Grant	250	0	0			
,, Proportion of Gas Account paid by Academy of Art	2	10	0			
				857	12	1
,, Hire of hall and rooms to sundry Societies	23	2	0			
,, Interest on fixed deposit.........	5	4	5			
				28	6	5
				£924	8	9

EXPENDITURE.	£ s. d.	£ s. d.
By Advertisements	34 9 6	
,, Assistant Secretary's salary to 30th April, 1881 (12 months)	100 0 0	
,, Books	128 9 8	
,, Bookbinding	25 2 9	
,, City Rates, &c.	23 12 6	
,, Covering and packing exchanges and presentations to Foreign Societies	5 11 6	
,, Delivering Society's Journal to Members	4 13 6	
,, Engraving illustrations for Journal	13 10 0	
,, Freight, carriage, packing-cases, &c.	25 19 0	
,, Furniture and effects	182 16 1	
,, Gas Account	16 1 2	
,, Housekeeper, to 30th April, 1881	10 0 0	
,, Ditto refreshments, monthly meetings	15 11 9	
,, Insurance on books and furniture	1 5 0	
,, Interest on mortgage	120 0 0	
,, Medical Section, printing, postage, &c.	18 4 4	
,, Postage, petty cash, &c.	35 0 0	
,, Printing	36 17 0	
,, Stationery and office books	5 10 6	
,, Sundry disbursements	9 0 6	
		811 14 9
,, Entrance fees, transferred to Building Account		75 12 0
,, Interest on deposit, transferred to Building Account	5 4 5	
,, Hire of rooms	23 2 0	
		28 6 5
,, Balance in Union Bank, 30th April, 1881		8 15 7
		£924 8 9

H. G. A. WRIGHT, Honorary Treasurer.
W. H. WEBB, Assistant Secretary.

Audited—
P. N. TREBECK.
W. G. MURRAY.

27th April, 1881.

BUILDING FUND ACCOUNT.

RECEIPTS.	£ s. d.	£ s. d.
To Amount at fixed deposit in Union Bank	300 0 0	
,, Balance in Union Bank, 30th April, 1880	181 15 6	
		481 15 6
,, Rent of hall to Academy of Art	58 0 0	
,, Hire of rooms to sundry Societies	31 9 0	
,, Ditto transferred from General Account	23 2 0	
		112 11 0
,, Interest on fixed deposit transferred from General Account		5 4 5
,, Subscriptions to Building Fund		110 5 0
,, Amount withdrawn from fixed deposit, 17th December, 1880	100 0 0	
,, Twelve months' interest on ditto	6 0 0	
		106 0 0
,, New members' entrance fees, transferred from General Account		75 12 0
		£891 7 11

EXPENDITURE.

	£	s.	d.	£	s.	d.
By Alexander Dean, enlarging library, &c.	38	15	7			
,, Ditto alterations and repairs to building, as per contract	426	14	3			
,, Insurance on building	5	0	0			
,, Housekeeper, &c.	2	2	6			
				472	12	4
,, Amount withdrawn from fixed deposit.........				100	0	0
,, Amount at fixed deposit, 1st May, 1880......	100	0	0			
,, Ditto 25th March, 1881..	100	0	0			
				200	0	0
,, Balance in Union Bank, 30th April, 1881				118	15	7
				£891	7	11

H. G. A. WRIGHT, Honorary Treasurer.
W. H. WEBB, Assistant Secretary.

Audited—
P. N. TREBECK.
W. G. MURRAY.
7th April, 1881.

STATEMENT OF ASSETS AND LIABILITIES FOR THE YEAR ENDING 30TH APRIL, 1881.

ASSETS.

	£	s.	d.
To Balance in Union Bank to credit of General Account	8	15	7
,, Subscriptions and entrance fees due	79	16	0
,, Furniture, painting, books, &c.—value unknown—taken as insured	1,000	0	0
,, Hire of hall due from University Musical Society	1	1	0
,, ,, ,, N.S.W. Branch British Medical Association	2	2	0
,, Premises in Elizabeth-street (cost of purchase)	3,525	0	0
,, Balance in Union Bank to credit of Building Fund Account	118	15	7
,, Amount of fixed deposits ,, ,,	200	0	0
	£4,935	10	2

LIABILITIES.

	£	s.	d.
By Trübner & Co.—Periodicals..	47	18	6
,, John Sands—Bookbinding	16	12	0
,, City Treasurer—Sewerage rate	3	10	0
,, F. Cunninghame & Co.—Printing	5	19	6
,, Savings Bank—Loan on mortgage	2,000	0	0
,, Bad debts—Hire of hall not paid	3	3	0
,, Balance of Assets over Liabilities	2,858	7	2
	£4,935	10	2

H. G. A. WRIGHT, Honorary Treasurer.
W. H. WEBB, Assistant Secretary.

Audited—
P. N. TREBECK.
W. G. MURRAY.
27 April, 1881.

The statement was adopted.

The Hon. Treasurer reported that the subscriptions to the Building Fund up to the 30th April, 1881, amounted to £1,187 11s., made up as follows:—

Original list	£1,064	14	0
1880	109	4	0
1881	13	13	0
	£1,187	11	0

and that the following gentlemen had promised to subscribe one guinea annually:—Messrs. W. A. Dixon, G. D. Hirst, Robert Hunt, Dr. Leibius, Professor Liversidge, Charles Moore, H. C. Russell, C. S. Wilkinson, and Dr. Wright.

Messrs. P. N. Trebeck and W. J. MacDonnell were elected Scrutineers for the election of officers and members of Council.

A ballot was then taken, and the following gentlemen were duly elected officers and members of Council for the current year:—

HONORARY PRESIDENT:

HIS EXCELLENCY THE RIGHT HON. LORD AUGUSTUS LOFTUS, G.C.B., &c., &c., &c.

PRESIDENT:

H. C. RUSSELL, B.A.,F.R.A.S., &c.

VICE-PRESIDENTS:

HON. PROFESSOR SMITH, C.M.G., M.D., &c.
CHRISTOPHER ROLLESTON, C.M.G.

HONORARY TREASURER:

H. G. A. WRIGHT, M.R.C.S.E.

HONORARY SECRETARIES:

PROFESSOR LIVERSIDGE, F.C.S., F.G.S., &c.
DR. ADOLPH LEIBIUS, F.C.S.

COUNCIL:

CHARLES MOORE, F.L.S.	C. S. WILKINSON, F.G.S.
W. A. DIXON, F.C.S.	G. D. HIRST.
ROBERT HUNT, F.G.S.	F. N. MANNING, M.D.

The following gentlemen were duly elected ordinary members of the Society:—

Dove, H. Percy, Sydney.
Griffin, T. H. F., Richmond.
Harnett, Richard, Mossman's Bay.
Poolman, Fredk. W., Sydney.
Starkey, John Thos., Sydney.

The certificates of eight new candidates were read for the second time, and of nine for the first time.

Two hundred and twenty-one donations were laid upon the table.

The names of the Committee-men of the different Sections of the Society were announced, viz. :—

Astronomy.—Chairman: H. C. Russell, B.A., F.R.A.S., F.M.S. Secretary: W. J. MacDonnell, F.R.A.S. Committee: H. G. A. Wright, M.R.C.S., E.; J. Brooks, F.R.G.S., W. J. Conder, and J. Tebbutt, F.R.A.S.

Microscopy.—Chairman: H. G. A. Wright, M.R.C.S.E. Secretary: P. R. Pedley. Committee: Dr. Morris, F. B. Kyngdon, G. D. Hirst, and T. Brindley.

Medical.—Chairman: Dr. C. K. Mackellar. Secretaries: Drs. Sydney Jones, and H. N. MacLaurin, M.A. Committee: Drs. Cox, Schuette, Cecil Morgan, and Alfred Roberts, M.R.C.S.

The Hon. Professor Smith, C.M.G., President, then read his address.

WEDNESDAY, 1 JUNE, 1881.

H. C. Russell, B.A., F.R.A.S., President, in the Chair.

About thirty members were present.

The minutes of the last meeting were read and confirmed.

The following gentlemen were duly elected ordinary members of the Society :—

Barff, H. E., M.A., Sydney University.
Helms, Albert, Ph.D., Sydney University.
Elliott, F. W., Elizabeth Bay.
Foster, W. J., M.L.A., Newtown.
Reid, William, Sydney.
Roberts, C. J., Potts's Point.

The certificates of nine new candidates were read for the second time, and of seven for the first time.

Thirty-five donations were laid upon the table.

It was announced that the sum of £29 18s. had been subscribed to the Building Fund during the present year, and that Messrs. E. Ross Fairfax, F. C. Griffiths, and the Hon. Prof. Smith, C.M.G., had also promised an annual subscription of one guinea.

It was also announced that the sum of £20 had been received from members of the Royal Society of N.S.W., towards the establishment of a Biological Laboratory at Watson's Bay.

The Chairman then read a paper by Mr. H. Ling Roth, F.M.S., on "The Climate of Mackay, Queensland," also one by Mr. W. E. Abbott, entitled "Notes of a Journey on the Darling."

WEDNESDAY, 6 JULY, 1881.

H. C. RUSSELL, B.A., F.R.A.S., President, in the Chair.

About forty members were present.

The minutes of the last meeting were read and confirmed.

The following gentlemen were duly elected ordinary members of the Society:—

Delarue, L. H., Sydney.
Goergs, Karl W., Woollahra.
Harcus, Lorimer E., Sydney.
Knibbs, G. H., Sydney.
Newton, Dr. J. L., Mudgee.
Rennie, Edwd. H., M.A., B.Sc.
Smedley, John, Woollahra.
Souttar, John, Sydney.
Wesley, W. H., Randwick.

The certificates of seven new candidates were read for the second time, and of five for the first time.

Ninety-three donations were laid upon the table.

Professor LIVERSIDGE communicated the following papers, viz.:—

1. On "Smilax glycyphylla," by C. R. A. Wright, D.Sc., and E. H. RENNIE, M.A., B.Sc.
2. On "New Zealand Kauri Gum," by E. H. RENNIE, M.A., B. Sc.

The Rev. PETER MACPHERSON, M.A., read a paper on "Astronomy of the Australian Aborigines."

Mr. H. C. RUSSELL, B.A., F.R.A.S., read a paper on "The Spectrum and appearance of the recent Comet."

Several fossil specimens from Cuddy Springs, near Brewarrina, presented to the Society by Mr. James Nesbit, were exhibited.

WEDNESDAY, 3 AUGUST, 1881.

Mr. H. C. RUSSELL, B.A., F.R.A.S., President, in the Chair.

Between thirty and forty members were present.

The minutes of the last meeting were read and confirmed.

The following gentlemen were duly elected ordinary members of the Society:—

Evans, Dr. Thos., Sydney.
O'Connor, Rich. E., M.A., Sydney.
Roth, Henry Ling, F.S.S., F.M.S., Lond., Mackay, Queensland.
Shepherd, T. W., St. Leonards East.
Threlkeld, L. E., Burwood.
Watkins, Richard Sydney.

The certificates of five new candidates were read for the second time, and of eight for the first time.

A letter was received from Mr. Hyde Clarke, London, acknowledging his election as corresponding member, viz.:—

32, St. George's Square, S.W.,
9 April, 1881.

My dear Sir,

If I have not before acknowledged the distinction conferred upon me by the Royal Society of New South Wales, it is because I have been suffering during the winter, as I still am.

I greatly value this distinction, the first I have achieved in Australia, and I willingly accept your invitation to make further communications to the Royal Society, the high position of which I have long known.

I hope to send you some of my observations as to the Mootoo and some other languages of New Guinea; they will be of interest to the Society, as they throw an independent light on the phenomena of Australian language and culture.

These New Guinea languages have also African relationships, as have those of Australia, and with languages belonging to the epoch of culture, which I consider was that of a white race in Africa.

These New Guinea languages, however, have not the same roots as those of Australia, and no apparent relationship; but when traced up to the common stock of languages they tell the same tale.

The mistake is in supposing there was a primeval language of one set of roots, whereas there were many words for each idea, and several ideas for one word.

This brings me to ask you whether there is any knowledge of gesture or sign language in the Australian tribes. The U. S. Government is engaged in a special investigation of the Indian gesture languages, and I recommend to you their valuable manual.

At Constantinople I saw something of the gesture language of the mutes of the Seraglio.

I beg to present my respects to the President and Council of the Royal Society.

Yours faithfully,
HYDE CLARKE.

Professor Liversidge, &c., &c., &c.

The Chairman stated that he had received a letter from the United States Astronomer, asking him to make particular observations of the transit of Mercury in November next, and he hoped to have one or two stations in the country, and that he was taking preliminary steps for observing the transit of Venus in December, 1882.

Forty-three donations were laid upon the table.

Mr. W. A. Dixon, F.C.S., read a paper on "The Inorganic Constituents of some Epiphytic Ferns."

Mr. H. C. Russell, B.A., F.R.A.S., read a paper on "New Double Stars and Measures of some of Herschel's."

WEDNESDAY, 7 SEPTEMBER, 1881.

H. C. Russell, B.A., F.R.A.S., President, in the Chair.

About thirty members were present.

The minutes of the last meeting were read and confirmed.

The following gentlemen were duly elected ordinary members of the Society :—

Furber, T. F., Sydney.
Maclean, Dr. L. H. J., Sydney.
Smyth, F. L. S., M.A., F.R.G.S., Ashfield.
Wood, W. H. O'M., Sydney.

The certificates of eight new candidates were read for the second time, and of three for the first time.

Eighty donations were laid upon the table.

Mr. John Tebbutt, F.R.A.S., then read a paper on "Comet II, 1881."

Mr. Charles Moore, F.L.S., drew attention to the extraordinary temperatures observable in the County of Cumberland, N.S.W., and suggested that members should make observations of the temperature and rainfall.

WEDNESDAY, 28 SEPTEMBER, 1881.

A Conversazione was held in the great hall of the University, under the management of a Committee, composed of the President, Mr. H. C. Russell, B.A., the Hon. Secretaries, Professor Liversidge, Dr. Leibius, and Messrs. Hunt, Moore, and Hirst, members of the Council.

The hall and the approaches were tastefully decorated with palms, ferns, and rare pot plants, by Mr. C. Moore, F.L.S., the Director of the Botanic Gardens.

The number of guests present was between 600 and 700.

LIST OF EXHIBITORS.

BOLDING, H. J.—Microscope, showing *Trichina spiralis*, &c.
BRINDLEY, Thos.—Microscope, showing polariscope objects.
COX, Dr. James, F.L.S.—Rare shells, principally specimens of Australian Volutes, and land shells from the Solomon Islands; also, *Cypræa princeps* and *Cypræa Thatcheri*.
CRACKNELL, E. C.—Faure's Secondary Battery for the storage of electricity.
DE LISSA, S.—Microscope.
DELARUE, L. H.—1. Binocular microscope and objects. 2. Graphoscope and photographs.
DEPARTMENT OF MINES.—1. A collection of minerals and fossils from New South Wales. 2. Large geological map of the Colony, by the late Rev. W. B. Clarke, M.A., F.R.S. 3. Geological maps of the various gold and tin fields. 4. Two microscopes.
DIXON, W. A., F.C.S.—Crystallized chemical specimens.
FISCHER, Dr. C. F.—1. Spectroscope. 2. Polariscope. 3. Battery of stored electricity. 4. Anatomical models. 5. New form of chemical balance. 6. Four Microscopes.
FLAVELLE Bros.—Two microscopes.
FRASER, Robert.—Microscope, showing Foraminifera, Manly.

FRAZER, Hon. John, M.L.C.—Collection of large photographs, Australian flowers in water-colours, &c.

FULLER, Francis J.—Two rare old books.

GOERGS, K. W.—1. A universal alphabet, grammar, and language. 2. Microscope.

GOVERNMENT PRINTING OFFICE.—1. Specimen of the heliotype as applied to wood-engraving. 2. A new mode of transferring outlines of photographs of scenery, &c., to stone, for lithographing. 3. A new mode of preparing electrotypes of diagrams.

GRIFFIN, T. H. F.—Astronomical work, by Mercator, A.D. 1676.

HELMS, Dr. A.—1. Spectrum of chromium chloride. 2. Spectrum of nitrogen peroxide.

HUME, J. K.—Large specimens of sandstone, showing impressions of fossil leaves of Tertiary age.

HUNT, Robt., F.G.S., &c.—Microscope.

INGLIS, J.—Indian photographs and curiosities.

KINLOCH, J., M.A.—Portable gas and illuminating fluid.

KNOX, Edward W.—The method of estimating sugar by means of the polariscope.

KYNGDON, F. B.—Three microscopes.

LENEHAN, H. A.—1. Photographs of sculptured reliefs in the church of the Frari, Venice. 2. Swiss carving, "Our Lord's Supper."

LIVERSIDGE, Prof.—1. Cut gems, New South Wales. 2. Cut gems, Ceylon, &c. 3. Complete skeleton of moa, New Zealand. 4. Jablochoff electric candle. 5. London *Times*: Christmas Day, 1806. 6. Skull of large cave bear (*Ursus spelæus*) Moravia. 7. Agate dishes, &c. 8. Rocks sections under polarized light.

LLOYD, G. A., F.R.G.S.—1. 100 stereoscopic views of the Yosemite Valley. 2. Portfolio of engravings.

MACDONNELL, Samuel.—Apparatus used in America in modern bee-culture, accompanied by coloured plates.

MACPHERSON, Rev P., M.A.—1. Photographs from prints of the Giant's Causeway, published February 1, 1743. 2. Promissory note for threepence dated Hobart Town, May 16, 1826.

MANNING, Dr. F. N.—Six steel engravings.

MARTIN, Rev. George.—Binocular microscope, with crystals under polarized light.

MORIARTY, E. O.—Specimens of diamond drill cores from the bore put down by the Australian Diamond Rock Drill Company, at Temora diggings.

MULLENS, Josiah, F.R.G.S.—Fac-simile of the Harris Papyrus in the British Museum, date B.C. 1200.

PEDLEY, P. R.—Microscope.

ROYAL MINT.—1. Two microscopes. 2. Improved assay balance, by Oertling. 3. The Clarke memorial medal, in various stages of manufacture.

ROYAL SOCIETY OF NEW SOUTH WALES.—1. Microscope. 2. Autograph letters of eminent scientific men. 3. Steel engravings of eminent scientific men.

RUSSELL, H. C., B.A.—1. A new self-registering aneroid. 2. Machine for determining personal equation. 3. Barrel chronograph. 4. New form of barometer.

SURVEYOR GENERAL'S DEPARTMENT.—1. Eighteen-inch Everest theodolite, by Troughton and Simms. 2. Ten-inch do. do. do. 3. An equatorially-mounted clock heliostat, by Tornaghi, of Sydney.

UNIVERSITY.—1. Specimen of chemicals. 2. Rare books.

WALKER, H. O.—Binocular microscope.

WALKER, P. B.—1. Ruhmkorff's coil and vacuum tubes. 2. Two American Morse telegraph sounders.
WILKINSON, C. S., F.G.S.—A skull of an aboriginal chief, found in the Bland district.
WRIGHT, H. G. A., M.R.C.S.E.—1. *Phylloxera vastatrix:* female and young insects. 2. Circulation in *Nitetta translucens*, and other objects.
WRIGHT, Rev. E. H.—Mineral specimens from Bulloo River and Mud Spring at Lula Springs Station, Warrey's River.

WEDNESDAY, 5 OCTOBER, 1881.

Mr. CHARLES MOORE, F.L.S., in the Chair.

About twenty-five members were present.

The minutes of the last meeting were read and confirmed.

The following gentlemen were duly elected ordinary members of the Society:—

Crummer, Henry, Sydney.
Ewan, Dr. John Frazer.
Fiaschi, Thos., M.D., M.Ch. Univ. Pisa, Windsor.
Hay, William, Boomanoomana.
Jockel, Louis Conrad, L.R.C.P., L.R.C.S., Edin., Richmond.
Lloyd, Lancelot T., Sydney.
Mann, Herbert W., Sydney.
Roser, Karl, M.D., Sydney.

The certificates of three new candidates were read for the second time, and of five for the first time.

Sixty-seven donations were laid upon the table.

Mr. P. N. Trebeck then read a paper "on the History, Varieties, Qualities, and Uses of Wool," illustrated by a series of specimens.

WEDNESDAY, 2 NOVEMBER, 1881.

H. C. RUSSELL, B.A., F.R.A.S., President, in the Chair.

About twenty-five members were present.

The minutes of the last meeting were read and confirmed.

The following gentlemen were duly elected ordinary members of the Society:—

Lowe, Edwin, Jumble Plains.
Manning, His Honor Sir W. M., Primary Judge, Woollahra.
Philip, Dr. Alexander, Sydney.

The certificates of five new candidates were read for the second time, and of eight for the first time.

Seventy-eight donations were laid upon the table.

The PRESIDENT announced that a resolution had been passed at the last Council meeting to offer prizes of £25 each for the best

communication containing the results of original research or observation upon the subjects set forth in the following circular, which would be distributed to all the members as well as to kindred Societies :—

[*Circular.*]

THE ROYAL SOCIETY OF NEW SOUTH WALES.

The Society's House, 37, Elizabeth-street,
Sydney, November 2nd, 1881.

ORIGINAL RESEARCHES.

THE Royal Society of New South Wales offers a Prize for the best communication, containing the results of original research or observation, upon each of the following subjects :—

Series I.—To be sent in not later than September 30th, 1882.

1.—On the Aborigines of New South Wales.
2.—On the treatment of Auriferous Pyrites.
3.—On the Forage Plants indigenous to New South Wales.
4.—On the influence of the Australian climates and pastures upon the growth of Wool.

Series II.—To be sent in not later than August 31st, 1883.

5.—On the chemistry of the Australian Gums and Resins.
6.—On Water Supply in the *interior* of New South Wales.
7.—On the embryology and development of the Marsupials.
8.—On the Infusoria peculiar to Australia.

The competition is in no way confined to members of the Society, nor to residents in Australia, but is open to all without any restriction whatever, excepting that a prize will not be awarded to a member of the Council for the time being; neither will an award be made for a mere compilation, however meritorious in its way—the communication to be successful must be either wholly or in part the result of original observation or research on the part of the contributor.

The Society is fully sensible that the money value of the prize will not repay an investigator for the expenditure of his time and labour, but it is hoped that the honour will be regarded as a sufficient inducement and reward.

The successful papers will be published in the Society's Annual Volume. Fifty reprint copies will be furnished to the author free of expense.

It is the intention of the Society to offer additional prizes should this first attempt to encourage original scientific investigation be reasonably successful.

A. LIVERSIDGE, } HON. SECS.
A. LEIBIUS, }

In reply to Mr. Rolleston, the President said there probably would not be any difficulty in the way of adding to the list of subjects; he hoped that the Society would eventually be in a position to increase the number of prizes.

And in answer to Mr. C. Moore said that he thought it would be quite within the powers of the Council to deal with most of the subjects; but when the time came for adjudication, if they found it necessary to call in help they would do so.

He also stated that it was unanimously agreed to by the members of the Council that they should not in any way compete, and that if they felt disposed to write upon any of these subjects they should do so as non-competitors. It was felt that as judges they should be excluded from competition.

Professor Liversidge then read the introduction to a paper by Baron Ferdinand von Müeller, K.C.M.G., F.R.S., &c., viz., "Census of the Genera of Plants hitherto known as indigenous to Australia."

The Hon. Professor Smith said, as the time was early yet, perhaps the President would favour the Society with a few remarks upon the disastrous storm that had lately swept along our coast.

The President said he felt some difficulty in complying with their request, as he had been so much occupied with other matters that he had not been able to give the attention he would liked to have given to the investigation of the recent storm that had done so much damage on our coast. However, he might occupy a few minutes in telling them of some of the suggestions that had been made for predicting storms. They were aware that a system was in force in America by which they could predict a few days in advance the approach of a storm. The system at first sight looked very difficult to manage, yet every one was now convinced that that the weather must be subject to law, the same as everything else in nature. All the investigations going on in America, England, and Europe point to the same conclusion. He mentioned American system first, because it was the best in existence. America was a large country, and in times of peace the soldiers were scattered about the various States, and part of their duty was to record observations of the weather and transmit them to Washington. The military control over the observers thus secured rendered theirs the best system for collecting observations in existence. In almost every case when there was a storm centre—a barometrical depression—it was first seen at Mexico, and the barometers fall around this storm centre. From long experience, the authorities at Washington know what is going to happen, and they can tell whether the storm is to be severe or not. Having developed itself in Mexico, it proceeds along the valley of the Mississippi, up through the lakes to St. Lawrence, and then away out to the Atlantic. All the people who live along the rivers and

the lakes find the warnings of the utmost importance. He had been assured by the authorities at Washington that there would be a perfect hue and cry if they attempted to stop the storm warnings on the ground of expense, although a million and a half of dollars are spent upon them annually. They send warnings where rain is likely to fall, and of its probable intensity, where there is likely to be a flood, and of any storm winds worth mentioning. Of late warnings of important storms leaving the coast of America had been sent to England and the Continent, and it was found that some storms actually travelled across the Atlantic, and by examining the logs of the different vessels on the way the whole course of the storm and its effects can be traced. This must ultimately lead to these warnings being of immense value to shipping. But although the general laws of these storms are known very well, the particular characteristics cannot yet be made out very distinctly. For instance, supposing that on two different occasions the same barometrical conditions originate in Mexico, it did not follow that the storms would be exactly identical. The principal condition which affected the character of the storm was the place of meeting of the polar and equatorial currents. It appeared—although it was not as yet fully made out—that many of the storm centres were caused by the meeting of these two large masses of atmosphere. A mass of atmosphere going from the poles has a tendency to go to the west, and a mass going from the equator has a tendency to go towards the east, and as they meet the friction seems to originate circular storms. If these meet one of the storm centres, it probably develops itself into a serious hurricane. In England and in Europe the same experience had been obtained, though the observations had not been so complete. In America they have a much more extended country, large enough to contain the whole storm, and so bring it under observation, whereas in England they could only see one half of a storm, which often envelopes the whole of the island; but on the continent of Europe in many places observations of the most valuable character are being recorded.

Coming nearer home, until 1879 we were sending telegrams between the different Colonies at some disadvantage for want of co-operation. The question was whether the atmospheric rule was the same in the southern hemisphere as in the north. In 1879, at the first Meteorological Conference, it was arranged to take more united action among the different Colonies, and the result had been in part published in the recent report of the Conference at Melbourne. If they referred to that they would find that we are subject here to almost identically the same conditions as obtain in America and Europe. For some time past no important storm had reached New Zealand but they had sent Dr. Hector three or five days' notice of its approach. The

barometrical depression first appears in Western Australia; then it travels along the coast through South Australia and Victoria, and then it gets across to New Zealand. In most cases the storm centre seemed to travel along the south coast of Australia, and when the centre was about at Adelaide the weather here generally changed northerly or north-west, and then to the west or north-west, and the rain extended sometimes as far as the Lachlan. The recent storm did not appear on the south coast, and the first we saw of it was the depression of the barometer along this east coast. It had been supposed by some that this was a tropical storm, but as far as he had yet gone he did not think it was. However, he was not prepared to make any definite statement as to where it came from. It was an exception to the established rule, and may have been a tropical hurricane, but he did not think it was. This storm might have come right across the mainland, and coming to the ocean here immediately became intensified, which was quite a natural thing.

One of the decisions arrived at by the Conference was to complete a double line of barometers from the south coast as far north as possible. When this was done they hoped to be able to predict for several days to come what the weather would be, as was done in America and Europe. But the number of dangerous storms that come upon this coast was very small indeed. There had been no storm like this recent one since the "Dandenong" was wrecked in September, 1876. He hoped he had said enough to indicate to them the direction in which the investigations were going on, and that there was a promise of being able to predict with considerable success the weather in the future.

The Hon. Professor SMITH asked whether any unusual solar spots had been observed during the recent storms.

The PRESIDENT said there was a great outburst of solar spots at that time, but the sun was so much covered by the clouds at the time that there was not much opportunity of observing them. If he might express an opinion, it was that the spots on the sun were simply due to some cause acting from without, and similarly affecting the earth's atmosphere, and not as was sometimes said, the spots themselves are the cause of our atmospheric disturbances.

WEDNESDAY, 7 DECEMBER, 1881.

H. C. RUSSELL, B.A., F.R.A.S., President, in the Chair.

Between thirty-five and forty members were present.

The minutes of the last meeting were read and confirmed.

The following gentlemen were duly elected ordinary members of the Society :—

Amos, Robert, Sydney.
Harris, John, Sydney.
Poate, Frederic, Summer Hill.
West, Dr. A. A., Glebe.
Wright, Frederic, Sydney.

The certificates of eight new candidates were read for the second time, and of five for the first time.

It was resolved that Messrs. W. G. Murray and A. S. Webster be appointed Auditors for the current year.

Eighty-six donations were laid upon the table.

The following papers were read :—

"On the Transit of Mercury," by Mr. H. C. Russell, B.A., F.R.A.S.

"On the importance of a Comprehensive Scheme of Water Storage and Canalization for the future welfare of the Colony," by Mr. F. B. Gipps, C.E.

"The influence of Australian Forest Trees on the vaporization of Water," by Mr. T. W. Shepherd.

Attention was drawn to some specimens of cretaceous fossils from a well on the Dunlop Station, Darling River (lent by Mr. Chesney), by Prof. Liversidge.

ADDITIONS

TO THE

LIBRARY OF THE ROYAL SOCIETY OF NEW SOUTH WALES.

DONATIONS—1881.

The names of the Donors are in *Italics.*

TRANSACTIONS, JOURNALS, REPORTS, &C.

ABERDEEN :—The Aberdeen University Calendar, 1881-82. *The University.*

ADELAIDE :—Annual Report of the South Australian Institute, 14 October, 1881. *The Institute.*
A Practical Treatise on Tree Culture in South Australia. By J. E. Brown, F.L.S. *The Government Printer.*
Report of the Progress and Condition of the Botanic Garden and Government Plantations during 1880. *The Government Botanist.*
Meteorological Observations made at the Adelaide Observatory during 1879. *The Government Observer.*

AMSTERDAM :—Verslagen en Mededeelingen der Koninklijke Akademie van Wetenschappen, Tweede Reeks, Deel XV, 1880.
Jaarboek van de Koninklijke Akademie van Wetenschappen. *Royal Academy of Sciences, Amsterdam.*

AUCKLAND :—Report of the Auckland Institute and Museum for 1880-81. *The Institute.*

BALLAARAT :—Annual Report of the School of Mines, 9 Feb. 1881. *The Registrar, Ballaarat School of Mines.*

BALTIMORE :—Studies from the Biological Laboratory, Nos. 1 and 2.
Chesapeake Zoological Laboratory. Scientific Results, 1878.

The American Journal of Philology.	Vol. 1.	No. 1.	1880.
,, ,, ,,	,, 2.	,, 7.	Oct., 1881.
American Chemical Journal	,, 1.	,, 6.	Feb., 1880.
,, ,, ,,	,, 3.	,, 4.	Oct., 1881.
,, ,, ,,	,, 3.	,, 5.	Dec., 1881.
American Journal of Mathematics	,, 3.	,, 1.	March, 1880.
,, ,, ,,	,, 4.	,, 1.	March, 1881.

Johns Hopkins University Circulars. Nos. 1, 2, 3, and 9.
Fifth Annual Report of the Johns Hopkins University, 1880. *The Johns Hopkins University.*

BERLIN :—Monatsbericht der Königlich Preussischen Akademie der Wissenschaften zu Berlin.
July, September, October, November, December, 1880.
January, February, March, April, June, July, and August, 1881. *The Academy.*

BERNE :—Bulletins de l'Institut Géographique International, 1 October, 1880. *L'Institut Géographique International.*

BONN :—Verhandlungen des Naturhistorischen Vereines der Preussischen. Rheinlande und Westfalens, Ser. 4, Vol. V., Hälfte 2. 1878.
" " VI., " 1 and 2. 1879.
" " VII., " 1. 1880.
The Society.

BOSTON MASS., U.S.A. :—Proceedings of the American Academy of Arts and Sciences.
New Series, Vol. VII. } Parts 1 and 2.
Whole Series, Vol. XV. } *The Academy.*
Memoirs of the Boston Society of Natural History, Vol. III. Part 1, No. 3.
Proceedings of the Boston Society of Natural History, Vol. XX. Parts 2 and 3.
Occasional Papers of the Boston Society of Natural History, No. III., 1880. *The Society.*

BREMEN :—Abhandlungen, herausgegeben vom Naturwissenschaftlichen Verein zu Bremen, Band, 7. Heft 1. *The Society.*

BRUSSELS :—Annales Astronomiques, Tome III. New Series. 1880.
Annales Météorologiques, Tome I. Part 2. 1881.
Annuaire, 1880 and 1881.
Observations Météorologiques Internationales. 1878 and 1879.
Observatoire Royal de Bruxelles.
Procès-Verbaux des Séances de la Société Royale Malacologique de Belgique, Tome X. Jan. 8, Feb. 5, March 5, April 2. 1881.
The Society.
Bulletin de l'Academie Royale des Sciences, des Lettres, et des Beaux-Arts de Belgique, Tome 46, 47, 48, 49, 50.
Annuaire. 1879, 1880, 1881. *The Academy.*

CALCUTTA :—Proceedings of the Asiatic Society of Bengal.
Nos. 7, 8, 9, 10. 1880.
" 1, 2, 3, 4, 5, 6, 7, 8, 9. 1881.
Journal of the Asiatic Society of Bengal.
Vol. XLIX.. Part I. Nos. 2 and 4.
Extra number to Part I. for 1880.
" " Part II. Nos. 2, 3, and 4.
" L. " I. " 1, 2, 3, and 4.
" " " II. " 1, 2, 3, and 4.
The Society.
Memoirs of the Geological Survey of India, Vol. XVI. Parts 2 and 3.
" " " (Palæontologia Indica).
(Ser. II, XI, XII.) Vol. III. Part 2.
(" XII.) " " 1. (Supplement.)
Fossil Flora of the Gondwana System. Index to vol. I.
" " " " " II.
Records of the Geological Survey of India. Vol. XIII. Parts 3 and 4.
" " " " XIV. Part 1.
The Superintendent of the Geological Survey of India.

CARLSRUHE :—Programm der Grossherzoglich Badischen Polytechnischen Schule zu Carlsruhe. 1879–80, 1880–81.
Nine pamphlets, chiefly Medical Theses.
Bibliothek Grossherzoglichen Polytechnicums zu Carlsruhe.

CAMBRIDGE :—Proceedings of the Cambridge Philosophical Society. Vol. III. Parts 7 and 8.
Proceedings of the Cambridge Philosophical Society. Vol. IV. Part 1.
Transactions „ „ „ Vol. XII. Part 1.
The Society.
Catalogue of the Books in the Cambridge Free Library. Part II. 1881. (Reference Depart.)
Twenty-fourth and twenty-fifth Annual Reports.
The Cambridge Public Free Library.

CAMBRIDGE (MASS. U.S.A.) :—Bulletin of the Museum of Comparative Zoology at Harvard College. Vol. VIII. Nos. 1 to 14 inclusive.
The Museum.
"Psyche." (Organ of the Cambridge Entomological Club, Mass.) Vol. III. Nos. 78, 80, 81, 82, 83, 84, 85, 86. *The Editors.*

CHRISTIANIA :—Memoir of the Norwegian North Atlantic Expedition, 1876–78.
I. Chemistry. By Hercules Tornöe.
1. On the Air in Sea Water.
2. On the Carbonic Acid in Sea Water.
3. On the Amount of Salt in the water of the Norwegian Sea.
II. Zoology. Fishes, by Robert Collett.
III. „ Gephyrea, by Drs. D. C. Danielssen and J. Koren.
The Editorial Committee.

DIJON :—Mémoires de l'Académie des Sciences, Arts et Belles-Lettres de Dijon.
Tome VI, Ser, 3 1880. *The Academy.*

DRESDEN :—Zeitschrift des K. Sächsischen Statistischen Bureaus.
Vol. XXVI, Heft 1 and 2. *The Bureau.*
Mittheilungen aus der Verwaltung der Konigl-öffenlichen Bibliothek zu Dresden. 1876–1880.
Die General Direction der Königlichen Sammlungen für Kunst und Wissenschaft zu Dresden.

DUBLIN :—Proceedings of the Royal Irish Academy—
Polite Literature, &c. Vol. II. Ser. II. Part 2.
Science „ III. „ „ 5 and 6.
Transactions of the Royal Irish Academy—
Polite Literature, Vol. XXVII. Part 4.
Science „ XXVIII. „ 1 to 5. *The Academy.*

EDINBURGH :—Proceedings of the Royal Society of Edinburgh—
Session 1878–79.
„ 1879–80.
Transactions of the Royal Society of Edinburgh—
Vol. XXIX. Part 1. Session 1878-79.
„ „ 2. „ 1879–80. *The Society.*
Proceedings of the Royal Physical Society—
Session 1879–80. *The Society.*
Transactions and Proceedings of the Botanical Society—
Vol. XIV. Part 1. 1881. *The Society.*

FLORENCE :—Archivio per Società Italiana di Antropologia e la Etnologia.
Vol. XI. Fasc. 2. 1881. *The Society.*

FRANKFURT, A/M. :—Bericht über die Senckenbergische Naturforschende Gesellschaft. 1879–80.
Abhandlungen. Band XII. Heft 1 and 2. *The Society.*

GENEVA :—Bulletin de l'Institut National Genévois.
Tome XXIII. 1880. *The Institute.*

GOTTINGEN :—Nachrichten von der K. Gesellschaft der Wissenschaften und der Georgia Augusta. Universität. 1879.
Königliche Gesellschaft der Wissenschaften.

HAARLEM :—Archives du Musée Teyler.
New Ser. II. Vol. I. Part 1. 1881.
Bibliothèque du Musée Teyler.
Archives Néerlandaises des Sciences Exactes et Naturelles.
Tome XVI. Liv. 1 and 2. 1881.
Société Hollandaise des Sciences.

HALIFAX (Nova Scotia) :—Proceedings and Transactions of the Nova Scotian Institute of Natural Science—
Vol. V. Part III. 1880–81. *The Institute.*

HALLE (A.S.) :—Nova Acta Academiae Caesareae Leopoldinens-Carolinae Germanicae Naturae Curiosorum—
Vol. XXXV., XXXVI.
,, XLI. Parts 1 and 2.
Leopoldina. Heft 16, 1880.
Kaiserlich Leopoldinisch-Carolinisch Deutsche Akademie der Naturforscher zu Halle A.S.

HAMBURG :—Mittheilungen der Geographischen Gesellschaft in Hamburg. Heft 1. 1880-81.
Dr. Ludwig Leichhardt's Briefe an seine Angehörigen von Dr. G. Neumayer and Otto Leichhardt.
Geographischen Gesellschaft in Hamburg.

HEIDELBERG :—Verhandlungen des Naturhistorisch-Medicinischen Vereins zu Heidelberg.
N.F. Band III. Heft 1. *The Society.*

HOBART :—Report of the Salmon Commissioners for 1880.
The Commissioners.
Monthly Notices of Papers and Proceedings, and Report of the Royal Society of Tasmania for 1879. *The Society.*

IOWA CITY (Iowa) :—Bulletin of the Iowa Weather Service, January, February, March, and April, 1881.
The Director of the Iowa Weather Service.

JENA :—Jenaische Zeitschrift für Naturwissenschaft, herausgegeben von der Medicinisch—naturwissenschaftlichen Gesellschaft zu Jena.
Band XIV. N.F. Band VII. Supplement, Heft I.
,, XV. ,, VIII. Heft 1, 2, 3. *The Society.*

LAUSANNE :—Bulletin de la Société Vaudoise des Sciences Naturelles—
Vol. XVII. Nos. 84, 85, 86. *The Society.*

LEEDS :—Seventh Annual Report of the Yorkshire College, 1880-81.
The College.
Sixty-first Annual Report of the Council of the Leeds Philosophical and Literary Society, 1880-81. *The Society.*

LIÉGE :—Annales de la Société Géologique de Belgique—
Vol. VI. 1878–79. 4 Maps, Bassin de Liége.
,, Pl. 4, 5, 6, 7. *The Society.*

LILLE :—Annales de la Société Géologique du Nord—
Vol. VII. 1879–80. *The Society.*

LIVERPOOL :—Proceedings of the Literary and Philosophical Society of Liverpool—
Vol. XXXIII. 1878–9.
,, XXXIV. 1879–80. *The Society.*

LONDON :—The Journal of the Anthropological Institute of Great Britain and Ireland.
Vol. X. Nos. 2, 3, and 4.
Vol. XI. „ 1, and 2. *The Institute.*

The Journal of the Linnean Society—
Botany, Vol. XVIII. Nos. 109, 110, 111, 112, 113.
„ „ XIX. „ 114.
Zoology „ XV. „ 85, 86, 87, and 88.
List of Members, to October, 1881. *The Society.*

Report of the International Meteorological Committee Meeting at Berne, 1880. Non-official, No. 14.
Report of the Meteorological Council to the Royal Society for the year ending 31 March, 1880.
Quarterly Weather Report of the Meteorological Office. New Ser. Official No. 33. Part I. January—March, 1876.
The Meteorological Office.

Quarterly Journal of the Meteorological Society.
Vol. VI. No. 36.
VII. Nos. 37 and 38.
List of Fellows of the Meteorological Society.
The Annual Address of the President of the Meteorological Society. 19 January, 1881.
The Snow Storms of January 17 to 21, 1881. *The Society.*

Proceedings of the Physical Society of London.
Vol. IV. Parts 1, 2, 3, 4, 5. *The Society.*

Journal of the Quekett Microscopical Club.
Nos. 45, 46, 47, 48. *The Club.*

The Journal of the Royal Asiatic Society of Great Britain and Ireland.
Vol. XIII. Parts 1, 2, 3, 4. *The Society.*

Monthly Notices of the Royal Astronomical Society.
Vol. XLI. Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9.
Memoirs of the Royal Astronomical Society.
Vol. XLV. 1879-80. *The Society.*

Transactions of the Institution of Naval Architects.
Vol. XXII. 1881.
Index to Transactions of the Institution of Naval Architects.
Vols. I. to XXI. *The Institution.*

Proceedings of the Royal Colonial Institute.
Vol. XII. 1880-81.
Annual Report of the Council. 30 June, 1881.
Report of the Opening of the 13th Session. 22 November, 1881.
Catalogue of the Library of the Colonial Institute. *The Institute.*

Proceedings of the Royal Geographical Society.
Vol. III. Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12. *The Society.*

Transactions of the Royal Historical Society. Vol. IX.
The Society.

Proceedings of the Royal Institution of Great Britain.
Vol. IX. Part III. No. 72.
List of Members, &c. 1880. *The Institution.*

Journal of the Royal Microscopical Society.
(Ser. II.) Vol. I. Parts 1, 2, 3, 4, 5, 6. *The Society.*

Journal of the Royal United Service Institution.
Vol. XXIV. No. 108.
„ XXV. Nos. 109, 110, 111, 112.
List of Members. 15 April, 1881. *The Institution.*

Proceedings of the Royal Society.
Vol. XXXI. Nos. 206 to 211, incl.
„ XXXII. „ 212, 213. *The Society.*

LONDON—*continued.*

Philosophical Transactions of the Royal Society of London.
Vol. 171. Parts 2 and 3. 1880.
,, 172. Part 1. 1881.
List of Fellows. 30 November, 1880. *The Society.*
The Pharmaceutical Journal and Transactions.
Part 126. 1880.
,, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137. 1881.
The Calendar of the Pharmaceutical Society of Great Britain.
The Society.

LUXEMBOURG :—Publications de l'Institut Royal Grand-Ducal de Luxembourg, Section des Sciences Naturelles. Tome XVIII.
The Institute.

MANCHESTER :—Transactions of the Manchester Geological Society.
Vol. XV. Parts 10, 11. 1879-9.
,, XV. ,, 12 to 18, incl. 1879-80. *The Society.*
Annual Report of the Principal of the Owens College. 24 June, 1881.
The College.
Memoirs of the Literary and Philosophical Society, Manchester.
Vol. VI. 1879.
Proceedings of the Manchester Literary and Philosophical Society.
Vol. XVI. Session 1876-77.
,, XVII. ,, 1877-78.
,, XVIII. ,, 1878-79.
,, XIX. ,, 1879-80. *The Society.*

MARBURG :—Thirty-seven (37) Medical Theses. *The University.*

MELBOURNE :—Vital Statistics of Melbourne and Suburbs, Year 1880.
Census of Victoria, 1881. Approximate Returns.
,, ,, Religions of the People.
,, ,, Householders' Schedules, Tables 1 and 2.
Agricultural Statistics, 1880–81, Colony of Victoria, Year ending 31 March, 1881.
Australian Statistics, 1880. Preliminary Returns, Tables 1 and 2.
Statistical Register of the Colony of Victoria—
Part I. Blue Book.
II. Finance.
VI. Population.
VII. Accumulation.
Third Annual Report in connection with Friendly Societies.
Victorian Year Book for 1880–81.
Government Statist's Report on the Vital Statistics of Melbourne and Suburbs—Year 1881. *The Government Statist.*
Report of the Chief Inspector of Mines for 1880.
Mineral Statistics of Victoria for 1880.
Reports of the Mining Surveyors and Registrars—
Quarter ended 31 December, 1880.
31 March, 1881.
30 June, 1881.
30 September, 1881.
The Hon. the Minister of Mines.
Transactions and Proceedings of the Royal Society of Victoria.
Vol. XVII. *The Society.*
The Catalogue of the Public Library of Victoria.
Vols. I and II. *The Trustees of the Public Library, Museums and National Gallery of Victoria.*

METZ :—Dritter Jahresbericht des Vereins für Erdkunde zu Metz 1880.
The Society.

MIDDLESBORO' :—The Journal of the Iron and Steel Institute—
No. 2, 1880.
1, 1881. *The Institute.*

MONTREAL :—Proceedings of the Natural History Society of Montreal—
1868, 1869, 1870, 1878, 1880, 1881.
Constitution and By-laws.
The Society, per Major L. A. Huguet Latour.
Report of Progress for 1878–79 of the Geological Survey of Canada.
The Director of the Geological Survey of Canada.

MOSCOW :—Bulletin de la Société Impériale des Naturalistes de Moscou—
Nos. 1, 2, 3, 4, 1880.
No. 1, 1881.

MULHOUSE :—Bulletin de la Société Industrielle de Mulhouse—
November and December, 1880.
January, February, and March, April, May, June, and July, August, 1881. *The Society.*

NAPLES :—Mittheilungen aus der Zoologischen Station zu Neapel—
Band II., Heft 2, 3, 4. (*Dr. Dohrn*) *Zoological Station.*

NEUCHATEL :—Bulletin de la Société des Sciences Naturelles de Neuchatel.
Tome XII, Cahier Deuxième, 1881. *The Society.*

NEWCASTLE-UPON-TYNE :—Natural History Transactions of Northumberland and Durham—

Vol. I.	Parts 1, 2, and 3.	1865–6–7.	
II.		1868.	
III.	,, 1 and 2.	1869–70.	
IV.	,, 1 and 2.	1871–2.	
V.	,, 1, 2, and 3.	1873–5–7.	
VI.		1874.	
VII.	,, 1 and 2.	1878–80.	*The Society.*

Report of General Meetings of the Newcastle-upon-Tyne Chemical Society, held November 25 and December 10, 1880, January 27, February 24, and October 27, 1881. *The Society.*
Transactions of the North of England Institute of Mining and Mechanical Engineers—
Vol. 26. 1876–77.
27. 1877–78.
28. 1878–79.
29. 1879–80.
General Index to Transactions, Vols. 1 to 25, 1852–76.
Illustrations of Fossil Plants, by Dr. Lindley and W. Hatton.
Catalogue of the Hutton Collection of Fossil Plants, by G. A. Lebour.
An Account of the Strata of Northumberland and Durham as proved by Borings and Sinkings, A.B. *The Institute.*

NEW YORK :—Proceedings of the American Chemical Society.
Vol. I. Nos. 1–5. 1876-78.
,, II. ,, 1–4. 1878-79.
Journal of the American Chemical Society.
Vol. I. Nos. 1–11. 1879.
,, II. ,, 1–7. 1880.
List of Members, Nov., 1879. *The Society.*

OXFORD :—Catalogue of Books added to the Radcliffe Library during 1880.
Radcliffe Meteorological Observations.
Vol. XXXVIII. 1876-79. *The Radcliffe Trustees.*

PARIS :—Journal de l'École Polytechnique.
Tome XXIX, Cahier 48. 1880. *L'École Polytechnique.*

PENZANCE :—Transactions of the Royal Geological Society of Cornwall.
Vol. X. Part III. January, 1881. *The Society.*

PHILADELPHIA :—Transactions of the American Entomological Society.
Vol. VII. Nos. 1-4. 1878-79. *The Society.*
Proceedings of the American Philosophical Society.
Vol. XVIII. Nos. 104, 105, 106.
List of Members, 15 March, 1880. *The Society.*
The Journal of the Franklin Institute.
Vol. 111. Nos. 661, 662, 663, 665, 666, 667, 668.
„ 112. „ 669, 672. *The Institute.*
Ninth Annual Report of the Board of Directors of the Zoological Society of Philadelphia, 28 April, 1881. *The Society.*

PISA :—Atti della Società Toscana di Scienze Naturali, Processi Verbali.
14 November, 1880.
9 January and 8 May, 1881. *The Society.*

PLYMOUTH :—Annual Report and Transactions of the Plymouth Institution and Devon and Cornwall Natural History Society.
Vol. VII. Part III. 1880-81. *The Institution.*

ROME :—Atti della R. Accademia dei Lincei.
Vol. V. Fasc. 1 to 14 (inclusive).
„ VI. „ 1. *The Academy.*
Atti dell'Accademia Pontificia de' Nuovi Lincei.
Vol. XXXIII. Sessione 7*a*.
„ XXXIV. „ 1, 2, 3, 4, 5, 6.
„ 1*a*, 2*a*, 3*a*.
La Nuova Sede delli Accademie dell'Arcadia, d'Archeologia e dei Nuovi Lincei. *The Academy.*
Bollettino R. Comitato Geologico 'dItalia.
No. 11 e 12, 1880.
„ 1 e 2, 3 e 4, 5 e 6, 7 e 8, 9 e 10, 1880. *The Society.*
Bollettino della Società Geografica Italiana.
Vol. V. Fasc. 9, 11, 12, 1880.
Vol. VI. „ 2, 3, 4, 5, 6, 7, 1881. *The Society.*

SALEM :—Bulletin of the Essex Institute.
Vol. II. Nos. 1 to 12, 1879.
Essex Institute Historical Collections.
Vol. XVI. Parts 1 to 4, 1879. *The Institute.*

ST. LOUIS (Mo.) :—Transactions of the Academy of Science of St. Louis.
Vol. 4. No. 1., 1879.
Contributions to the Archæology of Missouri.
Part 1. Pottery. *The Academy.*

ST. PETERSBURG :—Bulletin de l'Academie Impériale des Sciences.
Tome XXV. No. 5.
XXVI. „ 1. *The Academy.*

STOCKHOLM :—Handlingar (Memoires). Band 14, Heft 2, 1876.
„ „ „ 15 „ 15–17, 1877–79, and
Atlas : Florideernes Morphologi, by J. G. Agardt.
Bihang (Supplément aux Memoires). Band 4, Heft 1, 2.
„ „ „ 5, „ 1, 2.
Ofversigt (Bulletin) Arg. Part 34-37. 1877–1880.
Lefnadsteckningar (Biographies des Membres). Band 2, Heft 1.
The Royal Swedish Academy of Sciences.

STUTTGART:—Württembergische Jahrbücher fur Statistik und Landeskunde, herausgegeben von dem K. Statistisch-Topographischen Bureau. Band II, Hälfte 2, 1880.
Band I, „ 1, 1881. *The Bureau.*
Jahreshefte des Vereins für Väterlandische Naturkunde in Württemberg, 1881. *The Society.*

SYDNEY:—The Proceedings of the Linnean Society of New South Wales. Vol. V. Part 4.
VI. „ 1, 2, 3. *The Society.*
Appendix to Benj. Anderson's Journey to Musadu.
Australian Fossil Remains in Australian Museum, Guide to. Krefft.
„ Land Shells Catalogue. Cox.
„ Longicorns, List of, Masters.
La Fosforescenza del Mare. Giglioli.
Geological Survey of Great Britain and of Museum of Practical Geology, London, Memoirs of. Vol. I., Vol. II. Parts 1 and 2.
The Iron Ores of Great Britain. Part 1.
Mining Records.
On the Tertiary Fluvio-Marine Formation, Isle of Wight.
Geological Survey of the United Kingdom.
Memoirs of—Decade I.-IV.
„ „ V.-VIII.
Literature in New South Wales. G. B. Barton.
Poets and Prose Writers of New South Wales. G. B. Barton.
Memoir on the Pentacrinus Europœus. J. V. Thompson.
Report of the Trustees of the Australian Museum, 1880.
The Trustees of the Australian Museum.
Geological Sketch Map of New South Wales.
The Mining Department.
Results of Astronomical Observations at the Sydney Observatory in the years 1877 and 1878.
Results of Rain and River Observations in New South Wales, 1880.
Results of Meteorological Observations in New South Wales, 1876, 1877, 1878, 1879.
Thunder and Hail Storms in New South Wales.
Recent Changes in the Surface of Jupiter. By H. C. Russell, B.A., F.R.A.S. *The Government Astronomer.*
Report of the Trustees, Sydney Free Public Library, for 1880–81.
The Principal Librarian.
The Australasian Medical Gazette. Nos. 1, 2, 3, 4.
The N.S.W. Branch of the British Medical Association.

TRIESTE:—Bollettino della Società Adriatica di Scienze Naturali in Trieste. Vol. VI. No. 1. *The Society.*

TRURO:—The Mineralogical Magazine and Journal of the Mineralogical Society of Great Britain and Ireland.
Vol. IV. Nos. 19 and 20.
List of Members, Feb. 1881. *The Society.*

VENICE:—Atti del Reale Istituto Veneto di Scienze Lettere ed Arti. Tome VI. Ser V. Nos. 4 to 10 (incl.). *The Institute.*

VIENNA:—Mittheilungen der Anthropologischen Gesellschaft in Wien.
Vol. X. Nos. 8–9. 1880.
„ „ 10–12. 1881. *The Society.*
Mittheilungen der Kais. und Kön. Geographischen Gesellschaft in Wien. Band XXII. N.F. XII. 1879. *The Society.*
Jahrbuch der Kaiserlich-Koniglichen Geologischen Reichsanstalt.
Vol. XXX. No. 4.
„ XXXI. „ 1. *The Society.*

VIENNA—*continued.*

Verhandlungen der K. K. Geologischen Reichsanstalt.

No. 14–17. 1879.
,, 12–18. 1880.
,, 1– 7. 1881. *The Society.*

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften Mathematisch—Naturwiss: Classe

Abth. 1	Band	LXXXI.	Heft	1–5.	
,, 1	,,	LXXXII.	,,	1 & 2.	
,, 2	,,	LXXXI.	,,	4 & 5.	
,, 2	,,	LXXXII.	,,	1 & 2.	
,, 3	,,	LXXXI.	,,	4 & 5.	
,, 3	,,	LXXXII.	,,	1 & 2.	

Register zu den Baenden 76 bis 80 der Sitzungsberichte der Math.-Naturw.: Classe der K. Akademie der Wissenschaften. Band 9. *The Academy.*

Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie. Band XVI. Jan. to Dec. 1881 (incl.) Band XVII. Jan. 1882.

Geologie des Zinnes von Dr. Eduard Reyer. *The Society.*

Verhandlungen der K.K. Zoologisch-botanischen Gesellschaft in Wien. Band XXX. 1880. *The Society.*

Jahrbücher der K.K. Central-Anstalt für Meteorologie und Erdmagnetismus. Band XVII. Erster Theil. 1880. *The Society.*

WASHINGTON:—Bulletin of the U.S. Geological and Geographical Survey of the Territories. Vol. VI. Nos. 1 and 2.

The Director of the Geological and Geographical Survey of the Territories.

Reported Dangers to Navigation in the North Pacific Ocean, &c. Supplement to First Edition, No. 416.

Sailing Directions for the Kattegat, Sound, &c., &c., Baltic Sea. No. 70.

List of Lights on the Atlantic, Gulf, and Pacific Coasts of the United States of America. No. $\frac{1}{36}$. 1 July, 1881.

List of Lights of South and East Coasts of Asia and Africa and the East Indies No. $\frac{2}{81}$. 10 August, 1881.

List of Lights of Atlantic Coast of Europe. No. $\frac{4}{83}$. 20 October, 1881.

U.S. Hydrographic Notices. No. 34 to 70 (incl.) 1881.
,, ,, Index to Nos. 1 to 100. 1880.

Notice to Mariners. No. 50 to 84 (incl.) 1881.

List of Charts and Plans published and withdrawn. Quarter ending 30 June, 1881. Quarter ending 30 Sept., 1881.

Charts—Harbours of West Coast of Mexico:—

Harbour of Guatulco, Santa Cruz, and Tangola Tangola. No. 877.
Port Acapulco. No. 872.
Istapa or Isla Grande Harbor. No. 878.
Sihuatanejo & Petatlan ,, 879.
Angeles & Sacrificios ,, 874.

Anchorages, West Coast of Mexico:—

Escondido and Morro Ayuca. No. 875.
North Pacific Ocean, in 4 Sheets. Nos. 526 to 529 inclusive.
The Coasts of Lower California and of the Gulf of California, in 3 sheets. Nos. 619 to 621 inclusive.
The Coast of Mexico. No. 622.
Guadeloupe and adjacent Islands. No. 363.
The Indian Ocean—North-western Sheet. No. 854*a*.
,, North-eastern ,, ,, 854*b*.
,, South-western ,, ,, 855*a*.
,, South-eastern ,, ,, 855*b*.

Hydrographic Office, Bureau of Navigation.

WASHINGTON—*continued.*
Smithsonian Report. 1878.
Smithsonian Miscellaneous Collections. Vols. 16 and 17. 1880.
Smithsonian Contributions to Knowledge. Vol. 22. 1880.
Index to Papers on Anthropology, published by Smithsonian Institution. 1847 to 1878. *The Smithsonian Institution.*
Daily Bulletin of Weather Reports. April and May, 1877.
Report of the Chief Signal Officer. 1879. *The Signal Office.*
Annual Report of the Director of the Mint. 30 June, 1880.
The Director of the Mint. Treasury Department.
Report of U.S. Coast Survey. 1877.
The U.S. Coast and Geodetic Survey Office.
U.S. Geological and Geographical Survey of the Territories of Idaho and Wyoming. 1877. Hayden.
Report of the U.S. Geological Survey of the Territories. Vol. XII. 1879. (Fresh-water Rhizopods of N. America. Leidy.)
The Hon. the Secretary of the Interior.
U.S. Geographical Surveys West of the 100th Meridian. Vol. VI. Botany. *The Chief of Engineers, U.S. Army.*
First Annual Report of the United States Geological Survey.
Clarence King, Director.
U.S. Geographical Surveys West of the 100th Meridian.
Vol. II. Astronomy and Barometric Hypsometry.
,, III. Geology.
,, IV. Palæontology.
,, V. Zoology.
,, VI. Botany.
Topographical Atlas of Geographical Explorations and Surveys West of the 100th Meridian. (Wheeler.) Crayon. Consisting of 8 Maps.
Capt. G. M. Wheeler, Corps of Engineers, U. S. Army.
Measurement of Powder Pressures in Cannon. By Dr. W. E. Woodbridge. *The Ordnance Department.*

WELLINGTON :—Reports of Geological Explorations during 1879–80.
Meteorological Report, 1880. *The Director, Colonial Museum.*
Transactions and Proceedings of the New Zealand Institute. Vol. XIII, 1880. *The Institute.*

ZAGREB (Hungary).
Viestnik hrvatskoga Arkeologickoga Druztva Godina III. Broj. 1, 2, 4.
,, IV. ,, 1.
The Society.

MISCELLANEOUS.

(Names of Donors in *Italics.*)

Adams, John Quincy.
Report upon Weights and Measures. Washington, 1821.
A Miscellaneous Treatise on Mathematical subjects. London, 1776.
H. E. Kater.

Adams, C. W.
On the Calculation of Distances by means of Reciprocal Vertical Angles.
The Author.

A Complete System of Geography. 2 vols. folio. London, 1747.
Robt. J. Hinder.

Announcement of the Medical Department of the University of Pennsylvania, 1881. *H. G. A. Wright, M.R.C.S.E.*

Annuaire de Ville-Marie, Vol. II. Liv. 3, 4. Montreal.
Major L. A. Huguet-Latour, M.A.

Astronomische Nachrichten,
Vols. 76 to 80, inclusive, complete.
,, 81 & 82, incomplete. *W. J. MacDonnell, F.R.A.S.*

Baily, Francis, F.R.S., &c.
Astronomical Tables and Formulæ, London, 1827. *H. E. Kater.*

Bailey, Fred. Manson, F.L.S.
The Fern World of Australia. Brisbane, 1881.
Rev. J. E. Tenison-Woods, F.L.S., &c.

Barlow, Peter.
New Mathematical Tables, London, 1814.

Bevan, B.
A Practical Treatise on the Sliding Rule, London, 1822.

Beaufoy, Col. Mark, F.R.S.
Nautical and Hydraulic Experiments. Vol. I. London, 1834.

Biot, J. B.
Précis Elémentaire de Physique Expérimentale. Tome, 1 and 2. Paris, 1821.

Bland, Miles, D.D., F.R.S., &c.
Geometrical Problems. Cambridge, 1827.

Bohnenberger, J. G. F.
Astronomie. Tübingen, 1811.

Bourdon, M.
Elémens d'Algèbre. Paris, 1820. *H. E. Kater.*

Brazier, John, C.M.Z.S.
Localitiés des Iles Australiennes, des Iles Salomon, d'autres Iles de la Mer Sud.
Notes on recent Mollusca found in Port Jackson, and on the Coast of New South Wales, and other localities, with their synonyms.
Remarks on *Megapodius Brazieri.* *The Author.*

Bulletin du Canal Interocéanique, Nos. 39, 41, 42, 47, 49. *The Bureau.*

Clarke Hyde F.R., Hist. Soc. :—
The Khita aud Khita-Peruvian Epoch.
The Turanian Epoch of the Romans.
Himalayan Origin and Connection of the Magyar and Ugrian.
The name Britannia, and its relationship to prehistoric populations.
On the Influence of Geological Reasoning on other branches of Knowledge.
On Prehistoric and Protohistoric Relations of the Populations of Asia and Europe.
A Question of Assimilation, and on the Eyes of Mongolians.
The Relations between Pasht, the Moon, and the Cat, in Egypt.
The Author.

Callet, F. :—
Tables Portatives de Logarithmes. Paris, 1795. *H. E. Kater.*

Catalogue of the Exhibits in the Tasmanian Court, Melbourne International Exhibition, 1880. *Hugh M. Hull.*

Congrès International de Géologie (Paris). *Professor Liversidge.*

Cosmos. 21 vols. 8vo. Tome I.-XXI. (incl.)
The late D. Nichol, Esq., per favour of Mr. J. Inglis.

Dewalque, G. :—
Sur l'Uniformité de la Langue Géologique. *Professor Liversidge.*

Dissertation and Letters on the Trigonometrical Survey of England and Wales. London, 1815. *H. E. Kater.*

Elementary Illustrations of the Celestial Mechanics of Laplace. Part the First. London, 1821. *H. E. Kater.*

Favenc, Ernest :—
The Great Austral Plain ; its Past, Present, and Future. *The Author.*

Fitton, W. H., M.D., F.R.S. :—
A Geological Sketch of the vicinity of Hastings. London, 1833. *H. E. Kater.*

Fleming, Sandford, C.M.G. :—
The adoption of a Prime Meridian to be common to all Nations. *The Author.*

Foreign Scientific Papers. Vols. 1, 2, 3.

Foreign Scientific Tracts. 1 vol. *H. E. Kater.*

Gibson, George A., M.D., D. Sc., Edin., F.R.S.E. :—
The action of Duboisia on the Circulation. *The Author.*

Haüy, R. J. :
Traité Elémentaire de Physique. Tomes 1 et 2. Paris, 1803. *H. E. Kater.*

Herschel, J. F. W., M.A., and James South, F.R.S., &c. :
Observations of 380 Double and Triple Stars. London, 1825. *H. E. Kater*

Herschel, J. F. W., A.M., F.R.S. :
The Calculus of Finite Differences. Cambridge, 1820. *H. E. Kater.*

Information for intending Emigrants to Tasmania. *Hugh M. Hull.*

Kater, Captain Henry, F.R.S. :
A description of a Vertical Floating Collimator. London, 1828.
A description of an Escapement for an Astronomical Clock. London, 1840.
An account of the construction and verification of a copy of The Imperial Standard Yard made for the Royal Society. London, 1831. *H. E. Kater.*

Lacroix, S. F. :
Elémens d'Algébre. Paris, 1825.

Lardner, Rev. Dionysius, A.M. :
An Elementary Treatise on the Differential and Integral Calculus. London, 1825.

Legendre, A. M. :
Eléments dé Géométrie. Paris, 1823.

Leonhard, Karl Cäsar ritter von :
Grundzüge der Geologie und Geognosie. Heidelberg, 1831. *H. E. Kater.*

Liversidge, A., F.C.S., F.G.S., &c., &c. :
Tables for Qualitative Chemical Analysis, arranged for the use of Students. *The Author.*

List of Evergreen Timber Trees of Tasmania. *The Parliamentary Librarian, Hobart.*

List of Premiums offered by the Montreal Horticultural Society, &c., at Exhibition to be held, September, 1881. *Major L. A. Huguet-Latour, M.A.*

New Zealand University Calendar, 1880. *Professor Liversidge.*

Owen, Professor, C.B., F.R.S., &c. :
Description of some remains of the Gigantic Land-Lizard (*Megalania Prisca*, Owen). Parts 2 and 3. *The Author.*

Papers on Astronomy and Instruments. 1 vol.

Papers on Astronomy and Natural Philosophy. 1 vol.

Poinsot, L.

Élemens de Statique. Paris, 1821. *H. E. Kater.*

Peppercorne, Fredk. S., C.E.
Monographs.
On Rainfall and Water Conservation in New South Wales.
Project of an Irrigation Canal in the Valley of the Nepean.
The Author.

Register of Medical Practitioners for 1882. *Medical Board of N.S.W.*

Report on the Pendulum Experiments made by the late Captain Henry Foster, R.N. London, 1834. *H. E. Kater.*

Report of Select Committee—"The Mineral Lands Act, 1877," Tasmania.
,, ,, ,, Mineral Resources, West Coast, ,,
,, ,, ,, Gold Fields Regulation Bill, ,,
,, ,, ,, Railway Extension, ,,

Reports. Boat Expeditions round Tasmania. 1815-16 and 1824. *Hugh M. Hull.*

Requisite Tables for Nautical Ephemeris, London, 1802.

Requisite Tables for Nautical Ephemeris, containing Table of Natural Verse Sines. London, 1819. *H. E. Kater.*

Reyer, E.
Zinn. Eine Geologisch-Montanistisch-Historische Monografie.
The Author.

Rules and By-laws, Southern Tasmanian Rifle Association.
Hugh M. Hull.

Sabine, Capt. Edward, R.A.
Pendulum Experiments. London, 1825. *H. E. Kater.*

Sandberg, C.P., C.E.
On Rail Specifications and Rail Inspection in Europe. *The Author.*

Scientific Tracts. Vol. I.

Simpson, Thomas, F.R.S.
The Doctrine and Application of Fluxions. London, 1750.

Star Tables. London, 1827. *H. E. Kater.*

Sur l'Uniformitè de la Nomenclature des Grandes Divisions de l'Ecorce Terrestre. (Bologne, 1881.) *Professor Liversidge.*

Sydney Morning Herald, from 1 Jan. to 31 Dec., 1881, inclusive.
The Hon. James Norton, M.L.C.

Tate, Professor Ralph, F.G.S., &c.
On the Australian Tertiary Palliobranchs.
The Geology about Port Wakefield.
On the Geographical Relations of the Pulmoniferous Mollusca of Victoria.
Descriptions of some New Species of South Australian Pulmonifera.
Description of a New Species of Belemnite from the Mesozoic Strata of Central Australia.
Supplement to a Census of the Indigenous Flowering Plants and Ferns of Extra-tropical South Australia.
The Anniversary Address. *The Author.*

Trigonometrical Survey of England and Wales. Vols. 1 and 2. London, 1799. *H. E. Kater.*

The Bendigo School of Mines Science Society Inaugural Address. 20 June, 1881. *The Registrar, School of Mines and Industries, Bendigo.*

The Canadian Antiquarian. Vol. IX. Nos. 1, 2, 3, 4. *Major L. A. Huguet-Latour, M.A.*

The Circle (from the Edinburgh Encyclopædia). *H. E. Kater.*

The Gazette Almanac, 1881. (Montreal.) *Major L. A. Huguet-Latour, M.A.*

Thureau, G., F.G.S. :
Report on Mines, Ben Lomond and St. Paul's River, Tasmania.
,, ,, West Coast, Tasmania.
,, ,, Gladstone, Mussel Roe, and Waterhouse, Tasmania. *Hugh M. Hull.*

Woods-Tenison, Rev. J. E., F.L.S., F.G.S., &c. :
Geology of Northern Queensland. *The Author.*

Vulliamy, B. L. :
On Public Clocks, and Supplement. London, 1828. *H. E. Kater.*

Periodicals Purchased in 1881.

American Journal of Science and Art.
Analyst.
Annales des Chimie et Physique.
Annales des Mines.
Annals of Natural History.
Art Journal.
Athenæum.
Botanical Journal (Trimen).
Chemical News.
Comptes Rendus.
Curtis's Botanical Magazine.
Dingler's Polytechnisches Journal.
Engineer.
English Mechanic.
Fresenius' Zeitschrift für Analytische Chemie.
Geological Magazine.
Journal of the Chemical Society.
,, of Science.
,, of the Society of Arts.
Journal and Transactions of the Photographic Society
Lancet.
L'Art.
Mining Journal.
Nature.
Notes and Queries.
Petermann's Mittheilungen.
Philosophical Magazine.
Popular Science Review.
Portfolio.
Proceedings of the Geologist's Association.
Quarterly Journal of the Geological Society.
,, ,, Microscopical Science.
Science Gossip.
Scientific American.
Southern Science Record.
Telegraphic Journal.
Zoologist.

Books Purchased in 1881.

Australian Dictionary of Dates and Men of the Time.
Australian Hand Book, 1881.
Encyclopædia Britannica. Vols. XII and XIII.
Huxley's Introduction to Classification of Animals.
Museum Godeffroy.
Nature. Vols. 1 to 12.
Palæontographical Society. Vol. 35.
Percy's Metallurgy: Introduction, Refractory Materials, and Fuel.
" " Lead.
" " Silver and Gold. Part I.
Philosophical Transactions of the Royal Society, London, from 1801 to 1873. 90 vols.
Rankin's Miscellaneous Papers.
Rassegna Semestrale delle Scienze Fisico Naturali in Italia. Vols. 1—8.
Report of the British Association, 1878, 1879, 1880.
Report of the Scientific Results of the Exploring Voyage of H.M.S. "Challenger," 1873-76. Zoology. Vols. I, II, III.
Wagner's Jahresbericht der Technischen Chemie, 1880.

Engravings, &c., in the Society's Collection.

Agassiz, Louis J. R. Engraved by C. H. Jeen.
Airy, Sir George B., K.C.B., F.R.S. By T. H. Maguire.
" " " " C. H. Jeen.
Ansted, David Thos., M.A., F.R.S., F.G.S. By T. H. Maguire.
Bowerbank, J. F. By T. H. Maguire.
Beche De la, Sir Henry Thomas, V.P.R.S. Painted by H. P. Bone. Engraved by W. Walker.
Bell, Thomas, F.R.S., F.L.S. By T. H. Maguire.
Brown, Robert, D.C.L., LL.D., F.R.S. Painted by H. W. Pickersgill, R.A. Engraved by Chas. Fox.
Brown, Robert, D.C.L., LL.D., F.R.S. By T. H. Maguire.
Buckland, Rev. William, D.D., F.R.S. Painted by Thomas Phillips, R.A. Engraved by Samuel Cousins.
Carpenter, William B., C.B., M.D., LL.D., F.R.S., F.L.S., F.G.S. By T. H. Maguire.
Children, John George, F.R.S. Engraved by E. U. Eddis.
Clarke, Rev. W. B., M.A., F.R.S. Painted by Signor Anivitti.
" " Photograph, life-size.
Darwin, Dr. Charles, F.R.S., M.A., F.G.S., F.L.S., &c. By T. H. Maguire.
Darwin, Dr. Charles, F.R.S., M.A., F.G.S., F.L.S., &c. Engraved by C. H. Jeen.
Dechen, Dr.
Doubleday, E. By T. H. Maguire.
Dumas, Jean Baptiste, F.R.S. Engraved by C. H. Jeen.
Faraday, Michael, F.R.S. " " "
" " " By T. H. Maguire.
Harvey, William. Engraved by C. H. Jeen.
Helmholtz, Prof. Hermann L. F. Engraved by C. H. Jeen.
Henslow, J. S., F.R.S. By T. H. Maguire.
Hooker, Sir Joseph Dalton, K.C.S.I., M.D., C.B., F.R.S., &c. By T. H. Maguire.
Hooker, Sir Joseph Dalton, K.C.S.I., M.D., C.B., F.R.S., &c. Engraved by C. H. Jeen.
Hooker, Sir W. J., F.R.S. By T. H. Maguire.
Huxley, Thomas Henry, F.R.S., LL.D., F.G.S., F.Z.S., F.L.S., &c. Engraved by C. H. Jeen.

Kirby, Rev. William, M.A., F.R.S., F.L.S. By T. H. Maguire.
Lankester, Edwin Ray, M.A., F.R.S. ,, ,,
Lindley, Dr. John, F.R.S. ,, ,,
Lyell, Sir Charles, Bart., F.R.S. ,, ,,
,, ,, ,, ,, Engraved by C. H. Jeen.
Murchison, Sir Roderick Impey, Bart., K.C.B., F.R.S. Engraved by W. Walker, from a painting by H. W. Pickersgill, R.A.
Murchison, Sir Roderick Impey, Bart., K.C.B., F.R.S. By T. H. Maguire.
Newton, Sir Isaac, from a painting by W. Gandy, junior, 1706. Drawn on stone by G. B. Black, 1848.
Owen, Richard, C.B., F.R.S. Engraved by W. Walker.
,, ,, ,, ,, T. H. Maguire.
,, ,, ,, ,, C. H. Jeen.
Phillips, John, F.R.S., F.G.S. By T. H. Maguire.
Playfair, The Right Hon. Lyon, C.B., M.P., F.R.S., LL.D. By T. H. Maguire.
Reeve, Lovell, F.R.S. By T. H. Maguire.
Sabine, General Sir Edward, K.C.B., F.R.S.
Schomburgk, Sir Robert Hermann, F.R.S., K.C.B. Engraved by Louis Zöllner.
Sedgwick, Rev. Adam, LL.D., F.R.S. By T. H. Maguire.
Spence, W. By T. H. Maguire.
Stokes, George Gabriel, F.R.S., LL.D. Engraved by C. H. Jeen.
Thomson, Sir Charles Wyville, F.R.S., LL.D. Engraved by C. H. Jeen.
Thomson, Sir William, F.R.S., LL.D., D.C.L. ,, ,, ,,
Tyndall, John, F.R.S., LL.D. Engraved by C. H. Jeen.
Waterhouse, George R. By T. H. Maguire.
Westwood, John O. ,, ,,
Wheatstone, Sir Charles, F.R.S. Engraved by C. H. Jeen.

Plaster Busts.

Her Majesty the Queen.
Michael Angelo.
Lord Bacon.
Baron Georges Cuvier.
William Harvey.
Baron F. H. A. von Humboldt.
Sir Isaac Newton.

Donations to the Society's Cabinets, 1881.

Collection of 559 Geological and Mineralogical specimens.
Catalogue of the Collection, and Lectures on Geology. 1 vol.
W. H. Wesley.

Six Fossil specimens from Cuddy Springs, near Brewarrina.
James Nisbet.

Native stone Tomahawk from the Cloncurry River.
Four Fossil specimens from a Mud Spring in the Flinders. *E. Palmer.*

EXCHANGES AND PRESENTATIONS

MADE BY THE

ROYAL SOCIETY OF NEW SOUTH WALES,

1881.

The publications for Europe are sent through Messrs. Trübner & Co., London; those for the United States of America and Canada are forwarded, via London, to the care of Messrs. Wesley & Co., Agents for the Smithsonian Institute; and in all other cases, not otherwise provided for, the parcels are transmitted by book post.

The Smithsonian Institute, Washington, U.S.A., and Messrs. Trübner & Co., 57, Ludgate Hill, London, E.C., have kindly undertaken to receive and forward to Sydney all communications and parcels intended for the Royal Society of New South Wales.

Presentations to the Society are acknowledged by letter, and in the Society's Annual Volume.

* Exchanges of Publications have been received from the Societies and Institutions distinguished by an asterisk.

In the following List the publications are indicated by numerals as follows:—

No. 1.—Journal of the Royal Society of New South Wales, 1880.
,, 2.—Report of the Mining Department of N.S.W., 1880.

AMERICA (UNITED STATES).

1. **Albany.**—*New York State Library, Albany. Nos. 1, 2.
2. **Annapolis (Md.).**—Naval Academy. No. 1.
3. **Baltimore.**—*Johns Hopkins' University. Nos. 1, 2.
4. **Beloit (Wis.).**—*Chief Geologist. Nos. 1, 2.
5. **Boston.**—*American Academy of Arts and Sciences. Nos. 1, 2.
6. ,, *Boston Society of Natural History. Nos. 1, 2.
7. **Buffalo.**—*Buffalo Society of Natural Sciences. Nos. 1, 2.
8. **Cambridge.**—*The Museum of Comparative Zoology, Harvard College. Nos. 1, 2.
9. ,, *Editor of "Psyche." Nos. 1, 2.
10. **Chicago.**—Academy of Sciences. Nos. 1, 2.
11. **Coldwater.**—Michigan Library Association. Nos. 1, 2.
12. **Davenport (Iowa).**—*Academy of Natural Sciences. Nos. 1, 2.
13. **Hoboken (N.J.).**—The Stevens' Institute of Technology. Nos. 1, 2.
14. **Minneapolis.**—*Minnesota Academy of Natural Sciences. Nos. 1, 2.
15. **Newhaven (Conn).**—*Connecticut Academy of Arts. Nos. 1, 2.
16. **New York.**—*American Chemical Society. Nos. 1, 2.
17. ,, *American Geographical Society of New York. Nos. 1, 2.
18. ,, Lyceum of Natural History. Nos. 1, 2.
19. ,, School of Mines, Columbia College. Nos. 1, 2.

20. **Philadelphia.**—*Academy of Natural Science. Nos. 1, 2.
21. ,, *American Entomological Society. Nos. 1, 2.
22. ,, *American Philosophical Society. Nos. 1, 2.
23. ,, *Franklin Institute. Nos. 1, 2.
24. ,, *Zoological Society of Philadelphia. Nos. 1, 2.
25. **Salem. (Mass.)**—Peabody Academy of Sciences. Nos. 1, 2.
26. ,, *Essex Institution. Nos. 1, 2.
27. **St. Louis.**—*Academy of Science. Nos. 1, 2.
28. **Washington.**—*Commissioner for Agriculture. Nos. 1, 2.
29. ,, *Dr. F. V. Hayden, Geological Survey of Territories. Nos. 1, 2.
30. ,, *Hydrographic Office. Nos. 1, 2.
31. ,, *Smithsonian Institute. Nos. 1, 2.
32. ,, *War Department. Nos. 1, 2.
33. ,, *Chief Signal Officer (War Department). Nos. 1, 2.
34. ,, *Director of the Mint (Treasury Department). Nos. 1, 2.
35. ,, *The Secretary (Treasury Department). Nos. 1, 2.
36. ,, *The Secretary (Navy Department). Nos. 1, 2.
37. ,, *U.S.A. Coast Survey (Navy Department). Nos. 1, 2.
38. ,, *Bureau of Navigation (Navy Department). Nos. 1, 2.
39. ,, *The Secretary (Department of the Interior). Nos. 1, 2.
40. ,, *U.S. National Museum (Department of the Interior). Nos. 1, 2.
41. ,, *Bureau of Education (Department of the Interior). Nos. 1, 2.
42. ,, *Office of Indian Affairs (Department of the Interior). Nos. 1, 2.
43. ,, *Surgeon General (U.S. Army). Nos. 1, 2.
44. ,, *Chief of Engineers (War Department). Nos. 1, 2.
45. ,, *Philosophical Society. Nos. 1, 2.
46. ,, *American Medical Association, Pennsylvania Avenue. No. 1.
47. ,, United States Patent Office. Nos. 1, 2.
48. ,, *Ordnance Department. Nos. 1, 2.

AUSTRIA.

49. **Prague.**—*Königlich böhmische Gesellschaft der Wissenschaften. Nos. 1, 2.
50. **Trieste.**—*Societa Adriatica di Scienze Naturale. Nos. 1, 2.
51. **Vienna.**—*Anthropologische Gesellschaft. No. 1.
52. ,, *Geographische Gesellschaft. Nos. 1, 2.
53. ,, *Geologische Reichsanstalt. Nos. 1, 2.
54. ,, *Kaiserliche Akademie der Wissenschaften. Nos. 1, 2.
55. ,, *Œsterreichische Gesellschaft für Meteorologie. No. 1.
56. ,, *K.K. Zoologisch-Botanische Gesellschaft. No. 1.
57. ,, *K. K. Central-Anstalt für Meteorologie und Erdmagnetismus. No. 1.

BELGIUM.

58. **Brussels.**—*Société Royale Malacologique de Belgique. Nos. 1, 2.
59. ,, *Académie Royal des Sciences des lettres, et des Beaux Arts. Nos. 1, 2.
60. **Liege.**— Société des Sciences. Nos. 1, 2.
61. ,, *Société Geologique de Belgique. Nos. 1, 2.
62. **Luxembourg.**—*Institut Royal grand-ducal de Luxembourg. Nos. 1, 2.

GREAT BRITAIN AND THE COLONIES.

63. **Birmingham.**—The Midland Institute. Nos. 1, 2.

64. **Cambridge.**—*The Philosophical Society. Nos. 1, 2.
65. ,, *The Public Free Library. Nos. 1, 2.
66. ,, The Union Society. Nos. 1, 2.
67. ,, The University Library. Nos. 1, 2.

68. **Dudley.**—Dudley and Midland Geological and Scientific Society. Nos. 1, 2.

69. **Leeds.**—*Philosophical and Literary Society. Nos. 1, 2.
70. ,, *The Yorkshire College. Nos. 1, 2.
71. ,, Journal of Conchology (Office, St. Ann Street). Nos. 1, 2.

72. **Liverpool.**—*Literary and Philosophical Society. Nos. 1, 2.

73. **London.** — Editor, *Cassell's Encyclopœdia*. Nos. 1, 2.
74. ,, Colonial Office, Downing-street. Nos. 1, 2.
75. ,, Editor, *Popular Science Review*. Nos. 1, 2.
76. ,, *Quekett Microscopical Club. Nos. 1, 2.
77. ,, *The Admiralty Library. No. 1.
78. ,, The Agent General (two copies). Nos. 1, 2.
79. ,, *The Anthropological Institute of Great Britain and Ireland. No. 1.
80. ,, The British Association. Nos. 1, 2.
81. ,, The British Museum (two copies). Nos. 1, 2.
82. ,, The Chemical Society. Nos. 1, 2.
83. ,, The Entomological Society. No. 1.
84. ,, The Geological Society. Nos. 1, 2.
85. ,, The Museum of Practical Geology. Nos. 1, 2.
86. ,, *The Institution of Civil Engineers. Nos. 1, 2.
87. ,, *The Institution of Naval Architects. Nos. 1, 2.
88. ,, *The Linnean Society. Nos. 1, 2.
89. ,, The London Institution. Nos. 1, 2.
90. ,, *The Meteorological Office. No. 1.
91. ,, *The Meteorological Society. No. 1.
92. ,, *The Physical Society, South Kensington Museum. Nos. 1, 2.
93. ,, *The Royal Asiatic Society of Great Britain and Ireland. Nos. 1, 2.
94. ,, *The Royal Astronomical Society. No. 1.
95. ,, *The Royal Colonial Institute. Nos. 1, 2.
96. ,, *The Royal College of Physicians. No. 1.
97. ,, The Royal College of Surgeons. No. 1.
98. ,, *The Royal Geographical Society. Nos. 1, 2.
99. ,, *The Royal Historical Society. No. 1.
100. ,, *The Royal Institution of Great Britain. Nos. 1, 2.
101. ,, *The Royal Microscopical Society. Nos. 1, 2.
102. ,, *The Royal School of Mines. Nos. 1, 2.
103. ,, *The Royal Society. Nos. 1, 2.
104. ,, The Royal Society of Literature. Nos. 1, 2.
105. ,, The Society of Arts. Nos. 1, 2.
106. ,, The Treasury Library. Nos. 1, 2.
107. ,, *The Royal United Service Institution. Nos. 1, 2.
108. ,, The War Office. Nos. 1, 2.
109. ,, Topographical and Statistical Depôt. Nos. 1, 2.
110. ,, The Zoological Society. No. 1.
111. ,, *Lord Lindsay's Observatory. No. 1.
112. ,, The Library, South Kensington Museum. Nos. 1 2.
113. ,, *Pharmaceutical Society of Great Britain. Nos. 1, 2.

114. **Manchester.**—*Literary and Philosophical Society. Nos. 1, 2.
115. ,, The Owens College. Nos. 1, 2.
116. ,, *The Geological Society. Nos. 1, 2.

117. **Middlesboro'.**—*Iron and Steel Institute. Nos. 1, 2.

118. **Newcastle-upon-Tyne.**—*Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne. Nos. 1, 2.
119. ,, *Chemical Society. Nos. 1, 2.
120. ,, *North of England Institute of Mining and Mechanical Engineers. Nos. 1, 2.

121. **Oxford.**—*The Ashmolean Library. Nos. 1, 2.
122. ,, *The Bodleian Library. Nos. 1, 2.
123. ,, *The Radcliffe Library. Nos. 1, 2.
124. ,, *The Radcliffe Observatory. No. 1.

125. **Penzance.**—*Royal Geological Society of Cornwall. Nos. 1, 2.

126. **Plymouth.**—*Devon and Cornwall Natural History Society. Nos. 1, 2.

127. **Truro.**—*Miners' Association of Cornwall and Devon. Nos. 1, 2.
128. ,, *Mineralogical Society of Great Britain and Ireland. Nos. 1, 2.

129. **Windsor.**—The Queen's Library. Nos. 1, 2.

Scotland.

130. **Aberdeen.**—*The University. Nos. 1, 2.

131. **Edinburgh.**—*Geological Society. Nos. 1, 2.
132. ,, *Royal Physical Society. Nos. 1, 2.
133. ,, *The Royal Society. Nos. 1, 2.
134. ,, *The Royal Observatory. No. 1.
135. ,, The University. Nos. 1, 2.
136. ,, *Royal Botanic Garden. No. 1.
137. ,, *Editor, *Encyclopædia Britannica*, Messrs. A. and C. Black. Nos. 1, 2.

138. **Glasgow.**—Geological Society. Nos. 1, 2.
139. ,, *The University. Nos. 1, 2.

Ireland.

140. **Dublin.**—Royal Geological Society of Ireland. Nos. 1, 2.
141. ,, *Royal Irish Academy. Nos. 1, 2.

Cape of Good Hope.

142. **Cape Town.**—*The Philosophical Society. Nos. 1, 2.

The Dominion of Canada.

143. **Halifax (Nova Scotia).**—*Nova Scotian Institute of Natural Science. Nos. 1, 2.

144. **Hamilton (Canada West).**—Scientific Association. Nos. 1, 2.

145. **Montreal.**—*Geological Survey of Canada. Nos. 1, 2.
146. ,, *Natural History Society of Montreal. Nos. 1, 2.

147. **Ottawa.**—Academy of Natural Sciences. Nos. 1, 2.

148. **Toronto.**—*Canadian Institute. Nos. 1, 2.

India.

149. **Calcutta.**—*The Asiatic Society of Bengal. Nos. 1, 2.
150. ,, The Geological Museum. Nos. 1, 2.
151. ,, *The Geological Survey of India. Nos. 1, 2.

Mauritius.

152. **Port Louis.**—The Royal Society of Arts and Sciences. Nos. 1, 2.
153. ,, Société d'Acclimatation. Nos. 1, 2.

New South Wales.

154. **Sydney.**— The Australian Club. No. 1.
155. ,, *The Australian Museum. No. 1.
156. ,, *The Free Public Library. No. 1.
157. ,, *The Linnean Society of N.S.W. No. 1.
158. ,, *The Mining Department. No. 1.
159. ,, *The Observatory. No. 1.
160. ,, The School of Arts. No. 1.
161. ,, The Union Club. No. 1.
162. ,, The University. No. 1.

New Zealand.

163. **Auckland.**—*Auckland Institute. Nos. 1, 2.
164. **Christchurch.**—Philosophical Society of Canterbury. Nos. 1, 2.
165. **Otago.**—Otago Institute. Nos. 1, 2.
166. **Wellington.**—The Philosophical Society. Nos. 1, 2.
167. ,, *Colonial Museum. Nos. 1, 2.
168. ,, *New Zealand Institute. Nos. 1, 2.

(Forwarded per favour of the Wellington Museum.)

Queensland.

169. **Brisbane.**—*The Philosophical Society. Nos. 1, 2.
170. ,, *The Acclimatization Society. No. 1.

South Australia.

171. **Adelaide.**—*The Observatory. No. 1.
172. ,, *The South Australian Institute. Nos. 1, 2.
173. ,, *The University. Nos. 1, 2.
174. ,, *The Government Botanist. Nos. 1, 2.
175. ,, *Royal Society of South Australia. Nos. 1, 2.

Tasmania.

176. **Hobart Town.**—*The Royal Society of Tasmania. No. 1, 2.

Victoria.

177. **Melbourne.**—*The Government Statist. Nos. 1, 2.
178. ,, *The Observatory. No. 1.
179. ,, *The Mining Department. Nos. 1, 2.
180. ,, *The Public Library. Nos. 1, 2.
181. ,, *The Royal Society of Victoria. Nos. 1, 2.
182. ,, *The University. Nos. 1, 2.
183. ,, The Eclectic Association. No. 1, 2.
184. ,, *The Government Botanist. No. 1.
185. ,, *The Registrar-General. Nos. 1, 2.

(Forwarded per favour of the Melbourne Public Library.)

FRANCE.

186. **Bordeaux.**—Académie des Sciences. Nos. 1, 2.
187. **Caen.**—*Académie Nationale des Science. Nos. 1, 2.
188. **Dijon.**—*Académie des Sciences, Arts et Belles-Lettres. Nos. 1, 2.
189. **Lille.**—*Société Geologique du Nord. Nos. 1, 2.
190. **Montpellier.**—*Académie des Sciences et Lettres. Nos. 1, 2.
191. **Paris.**—Académie des Sciences de l'Institut. Nos. 1, 2.
192. „ The Editor *Cosmos*. Nos. 1, 2.
193. „ *Dépôt des Cartes et Plans de la Marine. No. 1.
194. „ Ecole des Mines. Nos. 1, 2.
195. „ Ecole Normale Supérieure. Nos. 1, 2.
196. „ *Ecole Polytechnique. Nos. 1, 2.
197. „ Faculté du Médecine. No. 1.
198. „ Faculté des Sciences de la Sorbonne. Nos. 1, 2.
199. „ Jardin des Plantes. No. 1.
200. „ The Editor *Les Mondes*. Nos. 1, 2.
201. „ L'Observatoire. No. 1.
202. „ Museum d'Histoire Naturelle. Nos. 1, 2.
203. „ Société Botanique. No. 1.
204. „ The Editor *Revue des Cours Scientifiques*. Nos. 1, 2.
205. „ Société d'Anatomie. No. 1.
206. „ Société d'Anthropologie. No. 1.
207. „ Société de Biologie. No. 1
208. „ Société de Chirurgie. No. 1.
209. „ Société d'Encouragement pour l'Industrie Nationale. Nos. 1, 2.
210. „ Société de Geographie. Nos. 1, 2.
211. „ Société Entomologique. Nos. 1, 2.
212. „ *Société Geologique. Nos. 1, 2.
213. „ Société Météorologique de France. Nos. 1, 2.
214. „ Société Minéralogique. Nos. 1, 2.
215. „ *Société Philotechnique. Nos. 1, 2.
216. „ Société de Physique. Nos. 1, 2.
217. **Saint Etienne.**—Société de l'Industrie Universale. No. 1, 2.
218. **Toulouse.**—Académie des Sciences. Nos. 1, 2.

GERMANY.

219. **Bremen.**—*Naturwissenschaftlicher Verein zu Bremen. Nos. 1, 2.
220. **Berlin.**— Chemische Gesellschaft. Nos. 1, 2.
221. „ *Königliche Akademie der Wissenschaften. Nos. 1, 2.
222. **Bonn.**—*Naturhistorischer Verein der Preussischen Rheinlande und Wesphalens in Bonn. Nos. 1, 2.
223. **Braunschweig.**—*Verein für Naturwissenschaft zu Braunschweig. Nos. 1, 2.
224. **Carlsruhe.**—Naturwissenschaftlicher Verein zu Carlsruhe. Nos. 1, 2.
225. **Cassel.**—*Verein für Naturkunde. Nos. 1, 2.
226. **Chemnitz.**—*Naturwissenschaftliche Gesellschaft zu Chemnitz. Nos. 1, 2.
227. **Dresden.**—*Das Statistische Bureau des Ministeriums des Innern zu Dresden. Nos. 1, 2.
228. „ *Die Africanische Gesellschaft. No. 1.
229. „ *General-Direction der Königlichen Sammlungen für Kunst und Wissenschaft zu Dresden. Nos. 1, 2.
230. „ Königlich Geologisches Museum. Nos. 1, 2.

231. **Frankfurt a/M.**—*Senckenbergische Naturforschende Gesellschaft in Frankfurt a/M. Nos. 1, 2.
232. **Freiberg (Saxony).**—*Die Berg Akademie zu Freiberg. Nos. 1, 2.
233. ,, Naturforschende Gesellschaft zu Freiberg. Nos. 1, 2.
234. **Göttingen.**—*Königliche Gesellschaft der Wissenschaften in Göttingen. Nos. 1, 2.
235. **Görlitz.**—*Naturforschende Gesellschaft in Görlitz. Nos. 1, 2.
236. **Halle A.S.**—*Die Kaiserlich Deutsche Leopoldinisch—Carolinische Akademie der Naturforscher zu Halle A.S. (Prussia.) Nos. 1, 2.
237. **Hamburg.**—*Die Geographische Gesellschaft in Hamburg. Nos. 1, 2.
238. ,, *Verein für Naturwissenschaftliche Unterhaltung in Hamburg. Nos. 1, 2.
239. **Heidelberg.**—*Naturhistorisch Medicinische Gesellschaft zu Heidelberg. Nos. 1, 2.
240. **Jena.**—*Medicinisch Naturwissenschaftliche Gesellschaft. Nos. 1, 2.
241. **Konigsberg.**—*Die Physikalisch-ökonomische Gesellschaft. Nos. 1, 2.
242. **Leipzig (Saxony).**—University Library. Nos. 1, 2.
243. **Metz.**—*Verein für Erdkunde zu Metz. Nos. 1, 2.
244. **Marburg.**—*Gesellschaft zur Beförderung der Gesammten Naturwissenschaften in Marburg. Nos. 1, 2.
245. ,, *The University. Nos. 1, 2.
246. **Mulhouse.**—*Industrial Society. Nos. 1, 2.
247. **Munchen.**—*Königliche Akademie der Wissenschaften in München. Nos. 1, 2.
248. **Stuttgart.**—*Königliches Statistisch-Topographisches Bureau zu Stuttgart. Nos. 1, 2.
249. ,, *Der Verein für Vaterländische Naturkunde in Württemberg. Nos. 1, 2.

HUNGARY.

250. **Bistritz (in Siebenbürgen).**—*Direction der Gewerbeschule. Nos. 1, 2.
251. **Zagreb (Agram).**—*Sociètè Archeologique. Nos. 1, 2.

ITALY.

252. **Bologna.**—Accademia delle Scienze dell'Istituto. Nos. 1, 2.
253. ,, University. Nos. 1, 2.
254. **Florence.**—*Società Italiana di Antoropologia e di Etonologia. No. 1.
255. ,, Società Entomologica Italiana. No. 1.
256. **Genoa.**—Museo Civico di Storia Naturale. Nos. 1, 2.
257. **Milan.**—Reale Istituto Lombardo di Scienze Lettere ed Arti. Nos. 1, 2.
258. ,, Società Italiana di Scienze Naturali. Nos. 1, 2.
259. **Modena.**—*Académie Royale des Sciences Lettres et Arts de Modene. Nos. 1, 2.
260. **Naples.**—Società Reale Accademia delle Scienze. Nos. 1, 2.
261. ,, Club Africana. Nos. 1, 2.
262. ,, *Zoological Station (Dr. Dohrn). No. 1.
263. **Palermo.**—Accademia Palermitana di Scienze Lettre ed Arti. Nos. 1, 2.
264. ,, Reale Istituto Technico. Nos. 1, 2.

265. **Pisa.**—*Società Toscana di Scienze Naturali. Nos. 1, 2.
266. **Rome.**—*Accademia Pontificia de Nuovi Lincei. Nos. 1, 2.
267. ,, *Società Geografica. Nos. 1, 2.
268. ,, Circolo Geographico d'Italia. Nos. 1, 2.
269. ,, Osservatorio del Collegio Romano. No. 1.
270. ,, *R. Accademia die Lincei. Nos. 1, 2.
271. ,, *R. Comitato Geologico Italiano. Nos. 1, 2.
272. **Siena.**—R. Accademia de Fisiocritici. Nos. 1, 2.
273. **Turin.**—Reale Accademia delle Scienza. Nos. 1, 2.
274. ,, Regio Osservatorio della Regio Universita. No. 1.
275. **Venice.**—*Reale Istituto Veneto di Scienze Lettere ed Arti. Nos. 1, 2.

JAPAN.

276. **Yokohama.**—*Asiatic Society. Nos. 1, 2.

NETHERLANDS.

277. **Amsterdam.**—*Academie Royale des Sciences. Nos. 1, 2.
278. **Haarlem.**—*Société Hollandaise des Sciences. Nos. 1, 2.
279. ,, *La Bibliothéque de Musée Teyler. Nos. 1, 2.

NORWAY.

280. **Bergen.**—The Museum. Nos. 1, 2.
281. **Christiania.**—*Kongelige Norske Fredericks Universitet. Nos. 1, 2.

RUSSIA.

282. **Moscow.**—*La Société Imperiale des Naturalistes. Nos. 1, 2.
283. **St. Petersburg.**—*L'Académie Imperiale des Sciences. Nos. 1, 2.

SPAIN.

284. **Madrid.**—Instituto geografico y Estadistico. Nos. 1, 2.

SWEDEN.

285. **Stockholm.**—*Kongliga Svenska Ventenskapo-Akademie. Nos. 1, 2.
286. ,, The University. Nos. 1, 2.

SWITZERLAND.

287. **Berne.**—*L'Institut Geographique International. Nos. 1, 2.
288. **Geneva.**—*Institute Nationel Genevoie. Nos. 1, 2.
289. **Lausanne.**—*La Société Vaudoise des Sciences Naturelles. Nos. 1, 2.
290. **Neuchatel.**—*Société des Sciences Naturelles. Nos. 1, 2.

Number of Publications sent to	Great Britain	140
,, ,,	India and the Colonies	75
,, ,,	America	93
,, ,,	Europe	213
,, ,,	Editors of Periodicals	8
,, ,,	Asia (Japan)	2
	Total	531

A. LIVERSIDGE, } Hon. Secretaries.
A. LEIBIUS, }

The Society's House, Sydney,
18 July, 1881.

PROCEEDINGS OF THE SECTIONS
(IN ABSTRACT).

PROCEEDINGS OF THE SECTIONS
(IN ABSTRACT).

ASTRONOMY AND PHYSICS.

11 APRIL, 1881.

MR. J. BROOKS, F.R.G.S., in the Chair.

IT was resolved that the following members be appointed office-bearers:—Chairman: MR. H. C. RUSSELL, B.A., F.R.A.S. Secretary: MR. W. J. MACDONNELL, F.R.A.S. Committee: Messrs. J. BROOKS, F.R.G.S., W. J. CONDER, J. TEBBUTT, F.R.A.S., H. G. A. WRIGHT, M.R.C.S., and that the meetings of the Section be held on the first Friday in each month.

Resolved, that the Hon. Secretary be requested to send notices to all the members of the Royal Society of N.S.W. likely to interest themselves in the Section, asking their co-operation.

6 MAY, 1881.

Mr. H. C. RUSSELL, B.A., F.R.A.S., in the Chair.

Mr. BROOKS exhibited a Henderson's "Mensor," containing in a very compact form a number of philosophical and mathematical instruments used in surface and underground explorations and surveys.

Mr. BRINDLY exhibited a series of drawings of the planet Jupiter, in coloured crayons, taken during the opposition in 1880.

Mr. MACDONNELL exhibited a newly published translation of Galileo's Siderius Nuncius, in which an account of his first telescope discoveries is given.

The CHAIRMAN informed the Section that a plan for a series of continuous self-registering barometer readings was discussed at the recent Meteorological Conference, held at Melbourne, and he mentioned a plan of his own by means of which the desired object could be cheaply and effectively obtained, using only an ordinary aneroid barometer and small clock.

The SECRETARY was requested to prepare from time to time short notes of subjects of interest to the Section.

3 JUNE, 1881.

Mr. H. C. RUSSELL, B.A., F.R.A.S., in the Chair.

The SECRETARY read a paper by Mr. Tebbutt, F.R.A.S., on the comet discovered by him, 22nd May last.

The CHAIRMAN exhibited a photograph of part of the sun's disc, on a scale of 17 inches to the sun's diameter, showing the remarkable group of spots now visible. Mr. RUSSELL remarked that he had lately been observing Jupiter in the early morning, and that he noticed that the planet still showed a continuance of the disturbed state of the northern belt noticed at the last opposition.

Some discussion took place on the various methods adopted in limiting and controlling the exposure of solar photographs.

Mr. TREVOR JONES gave some particulars of the means he employed to ensure a continuance of the water supply at the Botany swamps during the late drought.

1 JULY, 1881.

Mr. H. G. A. WRIGHT, M.R.C.S., in the Chair.

Mr. J. TEBBUTT, F.R.A.S., read a paper on the star Lacaille 2145, and R. Coronæ.

Mr. BRINDLY read a few notes on the conjunction of Venus and Saturn, 6 June, 1880.

5 AUGUST, 1881.

Mr. H. C. RUSSELL, B.A., F.R.A.S., in the Chair.

The CHAIRMAN exhibited a Planté-Faure cell for the storage of electricity, and made some experiments with it, showing its capabilities of fusing platinum, steel and copper wires.

Mr. BROOKS read a paper by Mr. Conder, of the Trigonometrical Survey, on the longitude of Mount Lambie, obtained by independent observations of Moon Culminations, obtained by means of portable instruments.

The SECRETARY read a paper by Mr. J. Tebbutt, F.R.A.S., on the Orbit-Elements of Comet II, 1881. Mr. MACDONNELL also exhibited a small Barlow lens, by Wray, copies of Holden's Life of Sir Wm. Herschel, and the new edition of Smythe's Celestial Cycle, revised by G. F. Chambers.

2 SEPTEMBER, 1881.

Mr. H. C. RUSSELL, B.A., F.R.A.S., in the Chair.

A discussion took place on personal equation, and the Chairman stated that he had constructed an instrument for exhibiting the variation of this in different individuals, which he proposed showing at the approaching conversazione of the Society.

Mr. W. J. MACDONNELL, F.R.A.S., exhibited a first surface reflecting solar eye-piece; he also read a list of a few southern double stars resolved by his 3″·65 refractor.

4 OCTOBER, 1881.

Mr. H. G. A. WRIGHT, M.R.C.S., in the Chair.

The proceedings were of a conversational nature.

On the Star Lacaille 2145.

By JOHN TEBBUTT, F.R.A.S.

[*Read before the Astronomical Section of the Royal Society of N.S.W., 1 July, 1881.*]

As I know our Chairman is especially interested in that department of astronomy which relates to double stars, I desire to draw his attention, and likewise that of the other members of the Section, to the star numbered 2145 in the Catalogue of Lacaille. This star is interesting both as a double and as a variable. It is to be found in the catalogue contained in *Crossley, Gledhill, & Wilson's Handbook of Double Stars*, but no hint is there given as to its variable character, although both components are set down as of the eighth magnitude. The earliest record I can find is that of Lacaille, who observed it as a single star of the sixth magnitude. The next record is that in the Brisbane Catalogue, where it is numbered 1137, and stated to be of the same magnitude. In the *Handbook* just cited, there is given a list of measures, by Dunlop, J. Herschel, and Jacob, from which I select the following as showing the change in angle and distance of the components in the interval :—

Observer.	Epoch.	Angle.	Distance.
Dunlop............	1826·00	329·0°	3·00″
Herschel	1835·02	342·5°	3·86″
Jacob	1846·94	348·5°	3·22″
Jacob	1858 17	354·7°	2·18″

My attention being directed to this star, both by the recorded change of angle and distance, and by the statement of its magnitude, I turned the 4½-inch equatorial on it in March last. Owing, however, to the small power of the instrument, the fact that it was not driven by clockwork, and the closeness of the components, I found it a difficult object for measurement. The following are the results :—

Epoch.	Position—Angle.	No. of Obs.	Distance.	No. of Obs.
1881·214	12·7°	9	2·50	5
1881·219	10·1°	12	2·42	4

The distance is probably somewhat too great, but it is quite obvious that the small star has passed the meridian of its primary. My own estimates of the magnitudes of the components were 8¼ and 8½, and it is quite certain that Lacaille's small telescope could not have exhibited either of them under such conditions. The star is therefore certainly a variable, and probably a binary, and under these circumstances I think it would be an interesting object for the large equatorial of the Sydney Observatory.

June 27th, 1881.

On the Variable Star *R. Carinæ.*

By JOHN TEBBUTT, F.R.A.S.

[*Read before the Astronomical Section of the Royal Society of N.S.W.* *1 July, 1881.*]

MY attention was first directed to this star by the *Uranometria Argentina,* a copy of which magnificent work was presented to me by the Director of the Argentine National Observatory in the autumn of 1880. Perceiving from the remarks of Dr. Gould that it must prove one of the most remarkable variable stars south of the equator, I at once placed it in my list of objects for regular and systematic observation. The earliest record that I can find of the star is in Lacaille's Catalogue of 9766 stars in the Southern Hemisphere, where it is numbered 3932, and is put down as one of the 7th magnitude. It was observed three times with the mural circle at Parramatta, between May 2nd, 1822, and March 2nd, 1826, and is recorded in the Brisbane Catalogue as No. 2551, with a magnitude of 6·7. It is next to be found in a *Catalogue of seventy-six ruby-coloured or very intensly red insulated Stars,* on page 448 of *Sir John Herschel's Results of Astronomical Observations at the Cape of Good Hope.* Sir J. Herschel's observations were made on this star some time during the period 1834–8, and assign 8·0 as its magnitude. It is described by this astronomer as a "very intense sanguine star, between scarlet and carmine red." It was thrice observed at the Melbourne Observatory in 1867, namely, on March 31st, April 3rd and 5th, its magnitude on the first two dates being estimated at 6·5 and 6·0 respectively. It finds a place in the *First Melbourne General Catalogue of* 1227 *Stars* reduced to the epoch 1870·0 and is there numbered 480, with a mean magnitude of 6·2. Its mean position for that epoch is R.A. = 9h. 28m. 58·32s. N.P.D. = 152° 12′ 49·4″. No suspicion, however, seems to have crossed the minds of the Melbourne observers as to the true character of the star, and I believe it was not till the extensive examination of the southern heavens by Dr. Gould and his assistants that its variability was discovered. The following quotation from the *Uranometria* will best illustrate what has been done by the Cordoba observers in the matter:—

"The region in which this star is situated was mapped in December, 1870, and the magnitudes of stars in the immediate vicinity were estimated 1871, February 19th and June 9th, but this star was not remarked on any of these occasions. It was noted by Mr. Rock, 1871, June 20, as 6·5 magnitude, but as the

new scale had not yet been introduced, this estimate represents a much fainter magnitude. I identified the star as L 3993, which corresponded almost equally well with the position as plotted, and which was noted by Lacaille as 6½ mag., while this one, L 3932, was called 7 mag. The second estimate, July 6, showed the magnitude to be about 5·7, when the star was correctly identified and systematic observations at once begun. A careful and valuable series of observations made by Mr. Rock show the maximum to have occurred on July 17 of that year, its brightness being then intermediate between that of *g* and *L. Carinæ*, but nearer to the former. Between 1871, November 18, and 1872, March 29, it was only visible with the telescope, and several observations by Mr. Davis showed it to be between the 9th and 10th magnitude. On its reappearance to the unaided eye, comparisons were resumed by Mr. Rock, which indicate a maximum on June 10, when it was nearly equal to *M. Carinæ*. From October 5 to December 9, its magnitude was below 9, and during the last half of November it was not above 10. The comparisons in 1873 give the maximum brightness as 4·7 mag. on April 12, and for several days it surpassed *h. Carinæ*. In 1874 an excellent series of observations was made by Mr. F. H. Bigelow, showing a maximum, March 4th, with a magnitude superior to that of *L. Carinæ* or about the same as in 1871. The star was observed by Lacaille 1752, March 3, and noted as 7 mag. It is No. 2551 of the Brisbane Catalogue, where its magnitude is 6½; it is included in the list of red stars published on p. 448 of his Cape Observations, by Herschel, who gives it as 8 mag., and was observed by Ellery at Melbourne in 1867, March 31, as 6½ mag., and April 3 as 6 mag. The intervals between the maxima as they result from our observations are respectively 329, 306, and 326 days. The minimum appears to take place considerably more than half a period later than the maximum, and the variation of light at that time to be relatively slow. But while the magnitude is above 9, its change is quite rapid, being at the rate of about one unit monthly, and the duration of the maximum is very brief. Its red colour is perceptible at all stages, even while at the 10th magnitude. Following the principle already laid down, I have denoted the star by the letter R."

I am not aware if the Cordoba or any other observers have since followed the variations of this truly remarkable object. My own comparisons commenced on May 11th, 1880, and have been made at short intervals from that time down to the date of this paper. They were in fact made on sixty-nine different nights, extending over a period of nearly fourteen months. It was fortunate that my comparison work commenced while the star was yet approaching its minimum, for I was thereby enabled to determine this important point in its light-curve. Almost all the

comparisons while the star was telescopic were made by means of the 4½-inch equatorial armed with a comet eye-piece, the field of which was sufficiently great to include the variable and the comparison-stars at one view. Some few comparisons were made by means of a 3¼-inch refractor. At the close of the paper will be found two tables, one containing a list of the telescopic comparison stars, and the other the concluded magnitudes of the variable, for the whole period embraced by this paper. The co-ordinates of the comparison-stars are given with reference to the variable itself, and were determined from observations with the filar-micrometer of the 4½-inch equatorial. Some of the stars were excessively faint under artificial illumination, but their positions are sufficiently accurate for the purposes of ready identification. The comparisons of the variable were made with the utmost care. From May 11th to the close of November the telescopic comparison-stars were employed. Owing to the brightness of the moon on November 14th and 17th the variable could not be seen with the unassisted eye, but notwithstanding her presence on the 20th it could be readily seen without optical aid. From this time the comparisons were made by unassisted vision with a selection of stars from the *Uranometria*. So early as December 19th suspicions were entertained that the star had attained its maximum, and it was recorded as certainly diminishing on December 26th. At its maximum it was estimated to be precisely equal to No. 119 Carinæ of the *Uranometria*, which is synonymous with No. 3753 of Lacaille's catalogue. At the close of January I examined the smallest comparison stars by the method of limiting apertures, and found that those marked 2, 4, 6, and 7 could just be seen with the 4½-inch telescope with its aperture diminished to one inch, so I adopted their magnitudes as 9·2 and the magnitude of 12, or Lacaille 3993, which was the brightest in the field of the comet eye-piece before mentioned, was assumed from the *Uranometria* to be of the 6·9 magnitude. Adopting these stars as the limits of the scale I carefully estimated the relative magnitudes of the other stars: the resulting magnitudes are contained in the second column of the table. The accuracy of these estimates was confirmed on March 30th by a careful examination with the same telescope of a selection of stars from *Oeltzen's Argelander's Zonen-Beobachtungen* 15° *to* 31° *Sud. Dec. für* 1850. It will now be seen from the table of concluded magnitudes of *R. Carinæ* that the variable attained its minimum about July 5th and the following maximum about December 16th. Through all its stages the star was red, but especially so when telescopic, and its appearance at minimum was that of a red hazy ill-defined star. It at this time presented a larger disc than any of the comparison stars, excepting No. 1, which was also red. In the beginning of February it had again diminished so as to be just within range of unassisted vision, but in the telescope its light was

remarkably brilliant and striking. Towards the close of the month recourse was again had to the 4½-inch telescope. On March 1st, although the sky was beautifully clear and the moon absent, no trace of the star could be detected without optical aid. Its light steadily declined for some time, but during the past few weeks its rate of decrease has become very slow; indeed there is every reason to believe that the minimum has been again attained and that the star's light is again on the increase. Its progress towards a second maximum will be watched with considerable interest. It will be observed from the short intervals at which the comparisons have been made that we get a pretty accurate idea of the form of the light-curve during the period from minimum to minimum, and that there are no evidences of any secondary maximum or minimum during its progress.

It will now be interesting to compare the observations made at Windsor with those recorded at Cordoba. It appears from the extract already given from the *Uranometria* that the intervals between the maxima during the period 1871–4 were 329, 306, and 326 days. These give a mean period from maximum to maximum of 320 days, but the magnitudes actually attained at maximum appear to vary considerably, according to the Cordoba observations. At none of these maxima does the star appear to have been so conspicuous as at the last maximum on December 16th. Adopting the Cordoba maximum of July 17, 1871, as a well defined one, and my maximum just referred to, the resulting mean period would be 313 days, on the assumption that eleven periods had been accomplished in the interval. When the period comes to be ascertained more accurately by a connected series of observations, we shall be able to avail ourselves of the old estimates of Lacaille and Brisbane for comparison with the concluded light-curve. If the variations thus recorded are actual changes in the intensity of the light and heat of the star, those changes must be on a stupendous scale. We know that our own sun is subject to periodical variations of light and heat, but the question naturally suggests itself to our minds what would be the result should it ever become as variable in its character as the star we have been considering. The question may, I think, be easily answered. There can be no doubt about the result. All forms of organized life must perish from the solar system. It appears now from the remarks which I have made that the star *R. Carinæ* is a remarkable example of its class, and promises to be highly interesting to the astronomer. That our southern heavens are rich in variable stars is satisfactorily shown by the numerous instances in the pages of the *Uranometria*, and it appears that there is a tendency among these stars to group themselves along the course of the Milky Way. Our celebrated variable Eta Argûs, and the star which I discovered in Ara some

time ago, are both within the limits of this region. It was Sir John Herschel, I believe, who first pointed out this tendency in the grouping of the variable stars, but I think after all it is only due to the circumstance that the stars in general are far more numerous along this zone of the heavens. It is to be regretted that we have not an amateur astronomer in the southern hemisphere who, like Dr. Schmidt of Athens, devotes himself to this highly useful but not difficult department of astronomical research. The first paper which I had the honor of reading before our Society, in the days when it bore the title of the "Philosophical Society of New South Wales" was one on the "Desirability of a systematic search for and observation of Variable Stars in the Southern Hemisphere." This was in August, 1862. In that paper a list was given of the number of variables discovered in each decade of the present century, but during the last two decades the progress of discovery has gone on with accelerated rapidity. Can no amateur be found in New South Wales to work in this field which promises to be so fruitful? Not only is it desirable to discover new objects of this character, but it is likewise necessary to follow up the systematic comparison of those already known to be variable. We hear a vast deal about furnishing the Colony with large telescopes, but it will, I think, be time enough to talk about such an addition when the telescopes we have are fully availed of. Many of the small instruments of 3 inches aperture and upwards, already in the hands of private persons, might be rendered extremely serviceable by their employment in the search for and observation of variable stars. It would seem scarcely necessary to impress on the minds of those who talk much about large telescopes, but do little else, the truth of this maxim, namely, that as the body without the πνευμα, or animating spirit, is dead, so the grandest telescope in the world, if it be without an observer, is dead also; the observer is, in fact, the life and soul of his telescope, and the existence both of himself and his instrument is made known to future ages by the results which he achieves.

DIFFERENCES of the R. A. and N.P.D. of *R. Carinæ* and the Comparison Stars, together with the adopted magnitudes of the Comparison Stars.

Comparison Star.	Adopted Mag.	Co-ordinates in R.A (m. s.)	Co-ordinates in N.P.D. (′ ″)
No. 1	8·7	1 31·4 E.	26 28 S.
„ 2	9·2	1 32·1 „	8 5 S.
„ 3	8·6	1 52·0 „	20 24 N.
„ 4	9·2	2 56·1 „	0 45 S.
„ 5	8·5	3 8·4 „	20 13 N.
„ 6	9·2	3 52·6 „	10 8 S.
„ 7	9·2	4 30·0 „	9 0 N.
„ 8	8·0	6 4·9 „	14 41 N.
„ 9	9·1	6 46·2 „	3 52 S.
„ 10	8·0	6 46·8 „	14 51 N.
„ 11	8·5	7 8·7 „	27 17 S.
„ 12 (Lacaille 3993)	6·9	7 23·5 „	8 31 S.
„ 13	8·9	8 2·2 „	12 9 S.
„ 14	8·8	9 34·7 „	6 54 N.
„ 15	8·6	10 8·0 „	3 33 N.

Note.—The position of star No. 7 is assumed from alignments with the other stars.

CONCLUDED MAGNITUDES OF *R. Carinæ.*

Date.	Mag.	Date.	Mag.	Date.	Mag.
1880.		1880.		1881.	
May 11	8·2	Nov. 17	5·9	Jan. 26	6·1
„ 12	8·3	„ 20	5·7	„ 29	6·0
„ 18	8·3	„ 24	5·4	Feb. 10	6·4
„ 28	8·5	„ 30	5·3	„ 15	6·6
June 9	8·9	Dec. 1	5·2	„ 26	7·0
„ 28	9·0	„ 4	5·1	Mar. 1	7·0
July 5	9·2	„ 10	4·6	„ 7	7·5
„ 12	9·1	„ 12	4·4	„ 14	8·0
„ 20	9·0	„ 14	4·4	„ 18	8·2
„ 26	9·1	„ 16	4·3	„ 24	8·4
Aug. 4	9·1	„ 18	4·4	„ 30	8·6
„ 9	9·0	„ 19	4·4	April 7	8·7
„ 12	9·0	„ 22	4·5	„ 13	8·8
„ 22	9·0	„ 25	4·5	„ 19	8·8
Sept. 1	8·8	„ 26	4·7	„ 28	9·0
„ 18	7·5	„ 30	4·9	May 4	9·1
„ 30	7·0			„ 10	9·1
Oct. 10	6·9	1881.		„ 16	9·1
„ 26	6·7	Jan. 1	4·9	„ 21	9·1
„ 27	6·7	„ 5	4·9	June 1	9·2
„ 30	6·7	„ 6	4·9	„ 8	9·3
Nov. 1	6·6	„ 8	5·0	„ 20	9·1
„ 14	6·0	„ 15	5·2	„ 27	9·0
„ 15	6·0	„ 19	5·4		

On some observations for Longitude at Lambie.

By W. J. Conder.

[*Read before the Astronomical Section of the Royal Society of N.S.W., 5 August, 1881.*]

In submitting to the attention of the Members of Section A of the Royal Society the results of some observations for Longitude which were made in July and August, 1878, at Lambie, an important Station on the Trigonometrical Survey of this Colony, and of which the difference of longitude from the Sydney Observatory has been carefully determined by star transits and clock signals, recorded by means of the electric telegraph, I wish to explain that the observations were made as an experiment, or perhaps I should say an amusement—at any rate they were not intended for actual use on the Trigonometrical Survey. I was anxious to know for myself by practical experience the measure of precision in longitude which might be obtained by a very few independent lunar observations with portable instruments; and having an opportunity for testing the results, by comparison with the known position already ascertained by telegraph from the Observatory, I thought it as well to place them on record, as they may possibly be of interest to others, and this is my reason for trespassing on your time with this paper.

Papers marked A, B, and C contain in tabulated form the reduction of each observation; it will I presume be unnecessary to read them now, as they consist of figures only, which can only be useful or interesting for reference.

Referring to paper A; the first column gives the dates of observation and limb of the moon observed; column 2, the name of the star used for reference, taken from the Nautical Almanac; column 3, the resulting R. A. of the moon's limb, after applying the observed difference in sidereal time of transits between the moon and each star separately to the star's registered R.A. It may be noticed that out of the thirty-one values of the moon's R.A. given in this column two placed within brackets have been rejected, viz., one on the 9th July and one on the 6th August; this has been done in accordance with the criterion of Professor Pierce for the rejection of doubtful observations. Column 4 shows the number of seconds (leaving out the hours and minutes, which are of course the same as in column 3) of R.A. for the moon's limb at the time of transit over an assumed meridian 10 hours East from Greenwich, and very nearly identical with the meridian

of the place of observation. This R.A. has been deduced from the tabulated positions at the upper and lower Greenwich transits, regard having been taken of differences of the third and fourth order when requisite. To the tabular R.A.'s in this column there have been applied the corrections obtained from the published Greenwich observations of the same date. Column 5 contains the computed hourly variation of the moon's R.A. at the assumed meridian. Column 6 gives the resulting longitudes. At the foot of this paper the mean of the six culminations is shown to be 9h. 59m. 56·86s.; by telegraph from Sydney it is 58·99s., and by the observed occultation of Antares, 60·49s.

Paper B is the computation of the longitude from an observation of the occultation of Antares. Both phases of this phenomenon, immersion and emersion, were observed, and the results differ from each other, as shown at the foot of page 2, by 1·508 seconds. The instants of disappearance and re-appearance were recorded by pressing the connecting key of an electric chronograph in the usual manner; and (as mentioned in my notes of the observation) I was distinctly sensible of the existence of a small interval of time between the actual impression conveyed to the mind of what the eye had witnessed and the performance of the trifling muscular process of pressing on the key. I believe this to have been a very small interval, and estimated it in my notes as 0·1 of a second; this amount has therefore been applied as a part of the clock error. On more deliberate reflection I am of opinion that this correction was too small, and also it is probable that the phenomenon of emersion from the illuminated part of the moon's disc, although it was predicted by preliminary computation with considerable care, would not be noticed quite so instantaneously as the disappearance behind the dark part of the moon. If this is in accordance with the facts of the case, the observations of the immersion and emersion would agree more closely with each other, and also with the known longitude of the place.

In this instance it happened that the star Antares was very nearly behind the moon's centre at the meridian passage, so that I was enabled to observe the culmination in the usual way between the two phenomena of the occultation. This appeared to me an interesting practical test of the precision to be obtained from each of the two kinds of observations, occultations or culminations. As the resulting values of the longitude only differ 0·56 seconds, very little can be inferred in favour of either system from this example. I prefer the method of culminations, because the eye and hand being both prepared beforehand by noting the gradual approach of the object to the thread, a practical observer is enabled to make the electric connection coincident with the actual contact with the thread in the telescope, besides the advantage of having the mean of several threads instead of a

single observation. I also think that the observations are less liable to error from what may be termed the accidental irregularities on the moon's surface, the contact is more likely to be observed when the thread is practically tangential to the average surface; whereas the star at an occultation may happen to disappear behind the top of a lunar mountain or at the bottom of a valley; this certainly could produce but a very small error, but should be considered when the number of observations of this kind is limited.

Paper C is an extract from the published Greenwich corrections of the moon's R.A.

An inspection of this paper shows that there exists a considerable amount of uncertainty as to what correction should be applied; for instance, on the 16th July the value by the transit instrument differs just ½ a second from that with the altazimuth. This discrepancy means very nearly 15 seconds when reduced to longitude. The correction adopted for these observations is the arithmetical mean of the two groups taken separately as the most probable value; it is a rather strange coincidence however that by using for each day the corrections most nearly identical in time, a great reduction would be made of the range of errors in the resulting longitude. I have not as yet been able to procure the corrections of the R.A. from Washington or any other Observatories to combine with the Greenwich values. In the event of my obtaining them in a short time, I will with your permission take an opportunity of making an addition to these papers in the shape of a small table showing the results as deduced from such additional data.

For many years hence there will be instances in which the requirements for settlement as well as important scientific investigations, such as the transit of Venus, &c., will necessitate the determination of longitude by lunar observations, either by the method of occultations, culminations, or the similar process of lunar distances as practised at sea, and consequently the efforts of practical astronomers and surveyors may still be useful for that purpose; but the network of wires which now connects the most distant and otherwise isolated parts of the globe has, among other incalculable benefits, supplied astronomers with an easy and accurate solution of the otherwise difficult problem of the longitude; and it is to be hoped that the time has now nearly arrived when, by this means, such important positions as our Sydney Observatory and the others in the Australian Colonies may be fixed on the Map of the World with that minute precision which the method of electric signals only can achieve.

A.

LONGITUDE MT. LAMBIE.

Moon culminations.

Assumed longitude = 10h.

Date.	Star.	R.A. of Moon. Observed.	Tabular.	Hourly Variation.	Longitude.
		h. m. s.	s.	s.	h. m.
1878. July 8	ζ Virginis ...	13 40 26·73	27·547		9 59
1st	88 ,, ...	·97	—·437	Green^h Cor.	
limb.	85 ,, ...	·88			
	89 ,, ...	·84			
		13 40 26.855	27·110	139·62	53·43^s
July 9	Mc 727	14 37 42·09	42·828		
1st	B.A.C. 4854 ...	(.60)	—·437		
limb.	α Libræ	·16			
	B.A.C. 4923 ...	·07			
		14 37 42·107	42·391	146·77	53·03
July 15	h_2 Sagittarii ...	20 38 1·43	2·358		
	ρ Capricorni ...	1·69	—·437		
2nd	υ ,, ...	1·75			
limb.	B.A.C. 7209 ...	1·60			
	19 Capricorni ...	2·01			
	21 ,, ...	1·87			
		20 38 1·725	1,921	129·42	54·55
July 16	θ Capricorni ...	21 27 55·82	56·384		
	29 ,, ...	55·90	—·437		
2nd	ι ,, ...	55·75			
limb.	γ ,, ...	55·83			
	θ Aquarii ...	56.01			
	η ,, ...	56.09			
		21 27 55.900	55·947	120·46	58·60
Aug. 6	20 Libræ	15 19 24·36	24·888		
	B.A.C. 4984 ...	24·51	—·634		
1st	β Libræ	24·13			
limb.	B.A.C. 5197 ...	(25·35)			
	b Scorpii ...	24·29			
	A_2 ,, ...	24·34			
	α ,, ...	24·26			
		15 19 24·323	24·254	151·08	61·64

A—*continued.*

Date.	Star.	R.A. of Moon. Observed.	Tabular.	Hourly Variation.	Longitude.
1878.		h. m. s.	s.	s.	h. m.
Aug. 7	β_1 Scorpii ...	16 20 42·26	42·872		
	σ „ ...	·24	— ·634		
1st	μ Herculis ...	·21			
limb.	μ Sagittarii ...	·23			
		16 20 42·235	42·238	154·75	59·93

		h.	m.	s.
	Mean	9	59	56·86
	By Telegraph from Sydney			58·99
Aug. 7.	„ Occultation of Antares			60·49

B.

Occultation of Antares.

Mt. Lambie, August 7, 1878. $\phi = 33° 28' 25·37''$ S.

G.M.T.	Greenwich Cor. of R.A.	α	δ	π
d. h.	sec.	h. m. s.	° ′ ″	′ ″
6 20	— ·63	16 18 39·98	26 19 1·1 S	57 44·949
21	„	„ 21 8·79	„ 23 26·2	„ 43·510
22	„	„ 23 37·67	„ 27 41·6	„ 42·072
23	„	„ 26 6·62	„ 31 47·1	„ 40·635
	A =	16 21 59·41	26 9 49·9 =	D

	20h.	21h.	22h.	23h.
	m. s.	m. s.	m. s.	m. s.
α — A	— 3 19·43	—0 50·62	+ 1 38 26	+ 4 7·21
	—49′ 51·45″	—12′ 39·30″	+24′ 33·90″	+61′ 48·15″
Sin (α — A) ...	—8·1614414	—7·5659873	+7·8540392	+8·2547088
Cos. δ	9·9524801	9·9522036	9·9519363	9·9516787
Cosec. π	1·7747487	1·7749290	1·7751094	1·7752897
Log. x	—9·8886702	—9·2931199	+9·5810849	+9·9816772
x	— ·773874	— ·196390	+ ·381140	+ ·958688
x^1	+ ·577484	+ ·577530	+ ·577548	
δx^1	+ 46	+ ·18		

B—*continued.*

	20h.	21h.	22h.	23h.
$\delta + D$	52° 28′ 51·0″	33 16·1	37 31·5	41 37·0
$\delta - D$	0 9 11·2	13 36.3	17 51·7	21 57.2
Cos. $\frac{\alpha - A}{2}$ ...	9·9999886	9·9999993	9·9999972	9·9999825
Cos.^{2} $\frac{\alpha - A}{2}$ ...	9·9999772	9·9899986	9·9999944	9·9999650
Sin $(\delta - D)$ ...	7·4268836	7·5974236	7·7156461	7·8052236
Cosec. π	1·7747487	1·7749290	1·7751094	1·7752897
Log. 1	9·2016095	9·3723512	9·4907499	9·5804783
Sin. $\frac{\alpha - A}{2}$	−7·860383	−7·264968	+7·553012	+7·953696
Sin. $\frac{\alpha - A}{2}$ ...	5·720766	4·529936	5·106024	5·907392
Sin. $(\delta + D)$ ...	9·899355	9·899783	9·900194	9·900589
Cosec. π	1·774749	1·774929	1·775109	1·775290
Log. 2	7·394870	6·204648	6·781327	7·583271
1	·1590777	·2356954	·3095636	·3806083
2	24824	1602	6044	38306
y	+·161560	·235856	·310168	·384439
y^1	·074296	·074312	·074271	
y^1		+ 16	− 41	

Log. b 5·4996335
„ a 5·5010828

9·9985507

Log. $\frac{b^2}{a^2}$ 9·9971014

tan ϕ 9·8203499

9·8174513

$\phi' = 33° \; 17' \; 52·83''$

Cos. ϕ' 9·9221161
Cos. $(\phi - \phi^1)$ 9·9999980

− 9·9221141

Cos. ϕ 9·9212384

2)9·9991243

Log. ρ 9·9995622

		h.	m.	s.	
Ingress		15	41	14·50	
	Clock			− 35·86	
	μ	15	40	38·64	= 6ᵈ 20ʰ ·62829
	A	16	21	59·41	
	μ − A		− 41	20·77	= − 10° 20′ 11·55″
Egress		16	59	48·80	(− 35·86)
	μ	16	59	12·94	= 6ᵈ 21ʰ ·93424
	μ − A		+ 37	13·53	= + 9° 18′ 22·95″

B—*continued.*

	Immersion.	Emersion.
x_0	— ·411052	+ ·348160
y_0	+ ·208237	+ ·305281
ρ cos. ϕ^1 ...	9·9216783	9·9216783
Sin. $(\mu - A)$	—9·2538943	9·2087466
Log. ξ ...	—9·1755726	9·1304249
ξ	— ·149821	+ ·135028
ρ sin. ϕ^1 ...	9·7391297	
Cos. D ...	9·9580622	
Log. 1 ...	9·6921819	
ρ cos. ϕ^1 ...	9·9216783	9·9216783
Sin. D ...	9·6443794	9·6443794
Cos. $(\mu - A)$	9·9928939	9·9942457
Log. 2 ...	9·5589516	9·5603034
1	·4922457	·4922457
2	·3622027	·3633318
η	·130043	·128914
$x_0 - \xi$ ...	— ·261231	+ .208182
$y_0 - \eta$ ...	+ ·078194	+ ·176367
Log. $(x_0 - \xi)$	— 9·4170240	+ ·93183389
„ $(y_0 - \eta)$	8·8931734	9·2464173
tan. M ...	—0·5238514	+ 0·0719216

	Immersion. ° ′ ″	Emersion. ° ′ ″
M ...	253 20 9·7	49 43 21·3
Cos. M. ...	9.4575158	9·8105600
Log. m ...	9.4356576	9·4358573
Log. x^1 ...	9·7615618	9·7615874
„ y^1 ...	8·8710239	9·8708368
tan. N. ...	.8905379	·8907505
N. ...	82° 40′ 5·8″	82° 40′ 18·6″
Cos. N. ...	9.1058975	9·1056880
Log. n ...	9·7651264	9·7651488
M — N ...	170° 40′ 3·9″	327° 3′ 3·2″
(Sin M—N)	9·2099418	— 9·7355142
log. m ...	9·4356576	9·4358573
Comp. k...	·5644100	·5644100
	9·2100094	— 9·7357815
	° ′ ″	° ′ ″
ψ ...	9 20 1·4	212 58 19·1
M — N + ψ	180 0. 5·3	180 1 22·3
Sin. „ „	—5·4098508	— 6·6009748
m ...	9·4356576	9·4358573
3609·8565	3·5574905	3·5574905
$\frac{1}{n}$ ...	·2348736	·2348512
Cosec. ψ...	·7899906	— ·2642186
	—9·4278631	+ 0·0983723
	— 0·268s	+ 1·240s

Longitude ... ... 10h 0m 0·49s

C.

Extract from the published Greenwich corrections to the Moon's R.A. for 1878.

1878.	Transit Instru-ment.	Altazi-muth Instrument	1878.	Transit Instru-ment.	Altazi-muth Instrument
	Sec.	Sec.		Sec.	Sec.
July 6		+ ·33	July 15	·43	+ ·72
„ 7	+ ·49		„ 16	·49	— ·01
„ 8		·71	„ 17	·37	+ ·32
„ 13	·62	·76	„ 18	·56	·02
„ 14	·41	·34			

Mean ... ... + 0·437

Aug. 3		+ ·51	Aug. 7	·75	·71
„ 4		·46	„ 8	·70	·57
„ 6	+ ·71	·66			

Mean ... ... + 0·634

The Orbit-Elements of Comet II, 1881.

By J. TEBBUTT, F.R.A.S.

[*Read before the Astronomical Section, Royal Society of N.S.W., 5 August, 1881.*]

HAVING before reported to you the appearance of the recent large comet, I have now much pleasure in presenting to you an approximate determination of the orbit elements of that body. Owing to ill health and the pressure of other avocations foreign to astronomy, I have been obliged to defer the calculation of the orbit. The paper which I am now about to read is a brief one, but it contains, nevertheless, the results of a large amount of calculation, and the results themselves will, I am assured, be of an exceedingly interesting character, I have then deduced the following approximate parabola from my own observations on May 22nd, the evening of discovery, June 1st and 11th. The residuals for the middle place are very large, but I am unable in the limited time which I have at my disposal previously to the meeting to reduce them within the limits of errors of observation :—

Perihelion passage	1881, June 15·63318d. G.M.T.	
Longitude of the perihelion	263° 34′·0	M. Equinox, 1881·0
Longitude of the ascending node	270 37 ·2	M. Equinox, 1881·0
Inclination of the orbit	63 15 ·6	
Perihelion distance	0·74336	
Motion	Direct.	

It was supposed by some persons previously to the calculation of the orbit that our late visitor was identical with the Comets II, 1819, II, 1861, but I believe I explained satisfactorily in the *Herald* of 9th June last that such identity could not be possible. It appears, however, from a comparison of the above elements with those of the recorded comets that it is more probably a return of the Great Comet of 1807. This comet was discovered by Parisi, an Augustine monk, at Castro Giovanni, in Italy, on September 9th of that year, and some days afterwards by Pons at Marseilles. The observations extended over a period of nearly seven months, and the orbit was carefully investigated by several computers. In Olber's *Abhandlung über die Bahn eines Cometen*, Encke's edition, 1847, there are no fewer than fourteen sets of elements, all of which, except two, are parabolic. Readers of astronomical literature will call to mind that this comet is rendered interesting from the fact that it was subjected to examination by the powerful reflectors of Sir William Herschel, and also from the circumstance that its

movements were the subject of a classical memoir by the illustrious Bessel. Delambre, in his *Astronomie Théorique et Pratique, tome iii*, says that the period lies between 1403·6 and 2157·4 years, and that the perturbations will produce great changes in the elements, principally in the time of revolution. In fact, the length of the assigned period is almost the only circumstance that militates against the supposition of the identity of this comet with that which visited us in May and June last. We must, however, bear in mind that observations taken in the beginning of the present century are not so accurate as those now made by astronomers. In support of my remarks on the non-identity of our late visitor with the Comets II, 1819, II, 1861, and on its probable identity with that of 1807, I here give the orbit-elements of the three comets for comparison with those I have deduced. The elements of Comet II, 1819, and of Comet 1807 are by Brinkley and Bessel respectively, and those of Comet II, 1861, are from Dr. Heinrich Kreutz's definitive investigation, a copy of which elaborate work he kindly sent to me some months ago.

	Comet II, 1819.	Comet II, 1861.	Comet, 1807.
Perihelion passage, G.M.T.	June 27d. 17h.	June 11d. 12h.	Sept. 18d. 18h.
Longitude of perihelion	287° 57′	249° 21′	271° 57′
Longitude of ascending node	274 36	279 15	267 49
Inclination of the orbit...........	80 46	85 26	63 10
Perihelion distance................	0·3410	0·8224	0·6461
Period of revolution	....	409·4 years.	....

The longitudes are roughly corrected for the precession of the equinoxes since the respective epochs. Remarkable as our late visitor is in connection with its supposed identity with the comet of 1807, it is perhaps quite as remarkable in another respect. The fact is the earth has had an exceedingly narrow escape from being enveloped in the matter of the comet's tail. I find that on the evening of discovery, May 22nd, the distances of the comet from the sun and earth were respectively eighty-two and seventy-one millions of miles. For some days the earth and comet, as I at the time pointed out, were rapidly approaching each other. On the morning of June 12th, when my last reliable observation was taken, the respective distances had diminished to sixty-nine and thirty-two millions of miles. At sixteen minutes past 1 o'clock in the afternoon of June 16th, Sydney time, the comet passed through perihelion at a distance of sixty-nine millions of miles from the sun, and at eighteen minutes past 7 o'clock in the afternoon of the 19th it reached the plane of the earth's orbit at the ascending node. On looking at the elements before given it will be seen that the longitude of the node is 270° 37′, and I find that the heliocentric longitude of the earth at the same time was 268° 9′, so it follows on the assumption that the comet's tail pointed directly from the sun that the earth, had she been about

two and a half days more in advance in her orbit, would have been exactly in the prolongation of the axis of the tail and at a distance of twenty-five millions of miles from the comet's nucleus. A similar result would have followed had the comet been later by the same period in coming up to the node. In fact it is not at all improbable, when the orbit comes to be investigated from the whole assemblage of observations, that the earth was really involved to some extent in the diffused matter of the tail.

I shall now take my leave of this interesting subject, in the hope that I may be spared to return to it at a future opportunity. I may mention that my reports of the comet's appearance have now probably reached Europe, and that I am about to send all my observations fully reduced. In conclusion, I find from No. 2374 of the *Astronomische Nachrichten* a comet was discovered by Swift, in the United States, on the 30th April, and that according to elements by Dr. Oppenheim, in No. 2376, the latest date to hand, that comet must have come into the southern hemisphere. Indeed this circumstance was known to Lord Crawford, of the Dun Echt Observatory, and he promised at the May meeting of the Royal Astronomical Society to telegraph to Australia. I have not heard, however, if the promise was carried into effect. I myself was not aware of the comet's discovery till the 19th July, and it was then too late to search for it. According to Oppenheim's elements this comet passed its perihelion on May 21st, so that the comet of which this paper expressly treats will probably be No. II of 1881.

MICROSCOPICAL SECTION.

PRELIMINARY MEETING, HELD 18 APRIL, 1881.

Dr. WRIGHT was voted in the Chair.

It was decided to hold the meetings of the Section on the evenings of the second Monday in each month. The following gentlemen were elected office-bearers for the ensuing session:—Chairman: Dr. WRIGHT. Secretary: Mr. P. R. PEDLEY. Committee: Dr. MORRIS, Mr. F. B. KYNGDON, Mr. G. D. HIRST, Mr. T. BRINDLEY.

9 MAY, 1881.

Dr. WRIGHT in the Chair.

The Chairman exhibited a new Tolles' $\frac{1}{10}$ inch objective, the performance of which was remarkably satisfactory on a valve of *A. pellucida* mounted in the bisulphide of carbon and phosphorus medium. In ordering this objective Dr. WRIGHT suggested that the front of the setting should be constructed of gold, as being the metal least liable to be chemically acted upon by the various fluids used for the immersion of the lens. Mr. Tolles considered that a gold front would be inexpedient and unnecessary, and had had the front gilt instead. Mr. H. O. WALKER exhibited a Swift's $\frac{1}{2}$-inch objective, with which he successfully resolved *P. angulatum*.

13 JUNE, 1881.

Dr. WRIGHT in the Chair.

Dr. WRIGHT read some notes on the comparative performances of two $\frac{1}{10}$-inch objectives by Mr. Tolles, and a $\frac{1}{8}$-inch homogeneous lens by Mr. Zeiss, from which it was gathered that Mr. Zeiss's lens was more achromatic than those of Mr. Tolles, but that in the Tolles objectives the correction for spherical aberration was more perfect, thus admitting of the use of deeper eye-pieces.

Dr. MORRIS and Dr. WRIGHT exhibited the powers of the lenses in question on some exceedingly difficult valves of *N. rhomboides*, the striæ on which were remarkably faint and numbered about 90,000 to the inch.

Mr. J. U. C. COLYER read a note from Capt. Trouton describing a remarkably luminous appearance of the sea in lat. 11° 58′ N., long. 51° 53′ E. (off the coast of Aden, 100 miles west of Socotra), apparently occasioned by millions of animalculæ, which produced a snowy white sheen altogether differing from the ordinary phosphorescent appearance of the tropical seas.

11 JULY, 1881.

Dr. WRIGHT in the Chair.

Dr. WRIGHT exhibited *A. pellucida*, dry, resolved by Tolles' homogeneous $\frac{1}{10}$-inch objective.

Rev. Mr. MARTIN called the attention of the meeting to the beautiful black ground illumination to be obtained from the ordinary Webster condenser, in conjunction with Ross's new swinging tail-piece.

8 AUGUST, 1881.

Dr. WRIGHT in the Chair.

Through the kindness of Mr. L. Brück, the Secretary was enabled to exhibit a variety of new and interesting microscopical apparatus. Amongst these exhibits were two large and completely furnished microscopes, by Messrs. Hartnack of Paris, and by Messrs. Schmidt and Haensch of Berlin. Considerable interest was taken in the trial of Prof. Abbe's new condenser, which it was found could be worked up to an extremely high angle. A Loewe's microtome, and Hartnack's improved stereoscopic ocular, with two eye-pieces and adjustment for position of eyes, received a great amount of attention, and were much admired.

Dr. WRIGHT exhibited two samples of fossil diatoms, the one from Victoria, and the other from Gunnedah, New South Wales.

Mr. PEDLEY exhibited sections of brain and spinal cord.

14 SEPTEMBER, 1881.

Owing to the inclemency of the weather the meeting lapsed for want of a quorum.

12 OCTOBER, 1881.

Dr. WRIGHT in the Chair.

The CHAIRMAN exhibited two of Tolles' solid eye-pieces. With these eye-pieces—$\frac{1}{4}$ and $\frac{1}{8}$-inch—Dr. Wright was able to obtain greater amplification, with equal definition, and with proportionately less loss of light than with Huyghenian oculars of like powers.

Mr. PEDLEY exhibited a series of histological preparations.

14 NOVEMBER, 1881.

Dr. WRIGHT in the Chair.

The CHAIRMAN exhibited Dr. J. Edwards Smith's V-shaped diaphragm, and the last edition of Dr. Carpenter's "The Microscope." Dr. WRIGHT also exhibited the scales of a hairless podura from Mr. Sharp, of Adelong. This podura is in all probability identical with *Podura macrotoma* of Dr. G. W. Royston Pigott, the intimate structure of the scale being readily resolved into beaded spherules by Tolles' duplex $\frac{1}{10}$ o.g. Mr. PEDLEY exhibited a number of double-stained histological preparations, and fully explained the process.

MEDICAL SECTION.

The MEDICAL SECTION of the Royal Society held a preliminary meeting, April 29th, 1881, at which the following officers were appointed:—Chairman: Dr. MACKELLAR. Secretaries: Dr. JONES, Dr. MACLAURIN. Committee: Dr. COX, Dr. SCHUETTE, Dr. ROBERTS, Dr. MORGAN.

Seven general meetings were held, at which numerous papers were read and pathological specimens exhibited.

A paper read by Dr. Manning on the question, "Is Insanity increasing?" was recommended to the Council of the Society for publication.

H. N. MACLAURIN,
Hon. Sec., Medical Section.

Is Insanity increasing?

By Frederic Norton Manning, M.D.,
Inspector General of the Insane, New South Wales.

[*Read before the Medical Section of the Royal Society of N.S.W., September, 1881.*]

In two former papers read before this Section of the Royal Society of New South Wales, I have set forth the proportion of insane persons to the general population in this and other countries, and discussed at some length the causation of insanity. I now propose to try and answer the question, "Is insanity increasing?" This question is one not unfrequently asked in society, it is from time to time discussed in the public Press, and is of great social and practical importance. The occurrence of the Census year appears to be a specially fitting time for its discussion, because it affords us, so far as our own Colony is concerned, an opportunity of dealing with accurate returns, and eliminating errors which might arise in dealing with mere estimates of population.

The following short return shows the population of New South Wales, the number of insane and the proportion of insane persons per thousand of the population, on Dec. 31st, 1861, Dec. 31st, 1871, and April 3rd (Census day), 1881; the number of males and females being distinguished. For the statistics of population I am indebted to the courtesy of the Registrar-General, who advises me that those for 1881 are subject to the minor corrections which may be necessary in the final revision of the Census returns.

	Population.			No. of Insane.			Proportion per 1,000.		
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
Dec. 31, 1861	202,099	156,179	358,278	533	207	840	2·63	1·96	2·34
Dec. 31, 1871	284,150	235,013	519,163	879	508	1,387	3·09	2·38	2·67
April 3, 1881	411,052	337,830	748,882	1,307	828	2,135	3·18	2·45	2·85

From these figures it appears that, whilst the general population has in twenty years increased 109 per cent., the number of insane has increased 154 per cent., and the proportion of insane has risen from 2·34 per 1,000, or 1 in 426, to 2·85 per 1,000, or 1 in 350.

Taking the decennial periods, it will be seen that from 1861 to 1871 the increase of population was 45 per cent., and of insane persons 65 per cent.; the proportion of insane to population rising from 2·34 to 2·67 per 1,000; whilst from 1871 to 1881 the increase of population was 44 per cent. and of the insane 54 per cent.; the proportion of insane to population rising only from 2·67 to 2·85 per 1,000.

Turning to the neighbouring Colony of Victoria, we find that the increase in the number of insane during the last twenty years has been even greater than in this Colony. In 1861 the population of Victoria was 541,800, and the number of insane persons 702, or 1·29 per 1,000. In 1881, the population, as ascertained by Census, was in round numbers 855,000, whilst on Dec. 31, 1880, the number of insane had risen to 3,065, or 3·58 per 1,000; so that whilst the population had only increased by 57 per cent., the number of insane had more than quadrupled, and bore a proportion to the population nearly three times larger than in 1861.

The increase in the proportion of insane to population was much more marked during the period from 1861 to 1871 than from the latter date to 1881, being from 1·29 to 2·71 per 1,000 during the former ten years, and only from 2·71 to 3·58 per 1,000 during the latter.

In South Australia the population in 1871 was 185,626, the number of insane persons 324, and the proportion of insane to population 1·74 per 1,000, whilst at the close of 1880 the population was 267,662, the number of insane 587, and the proportion to population 2·19 per 1,000.

The increase in Queensland and New Zealand, with the details of which I will not trouble you, has been equally marked.

Going now to older countries, we find that in 1844 there were in England and Wales 20,611 registered insane persons. In 1861 the number had risen to 41,129, and in 1879 to 71,191. In 1844 there was one insane person in every 800 of the population; in 1861, one in about every 550, and in 1879 one in every 360.

The Commissioners in Lunacy for Scotland, in their report for the year 1879, state that when they entered on their duties in 1858, the number of insane persons officially known to the Board was 5,823, and that there has been an increase of 3,801 since that date. The insane under their jurisdiction have therefore increased 65 per cent. in twenty years, whilst the population has only increased 20 per cent. during the same period.

From the returns made by the Inspectors of Lunatic Asylums in Ireland, it appears that from 1846 to 1861 there was an increase of one-third in the number of insane, whilst the population, from emigration and other causes, decreased by 3 millions during the same period. And taking the period since 1861, the Inspectors

state in their report for 1879 that the number of insane has nearly doubled, whilst the population, owing to the enormous emigration, has been almost at a standstill.

From a report by M. Lunier, Inspector-General of the *Service des Aliénés*, published in 1870, it appears that from 1835 to 1870 the number of insane under official knowledge in France increased from 10,500 to 38,500, or nearly quadrupled, whilst the proportion to population tripled. From recent returns it appears that there has been an annual increase in the proportion of insane to population every year since 1870, but the rate of increase is now very small, and has for years been slowly diminishing.

I have not at hand statistics from other European countries, but from German, Belgian, Dutch, and other publications, the same story—an increase in the proportion of insane to population—can be gathered. In 1875 Professor Livi, at Reggio, informed me that the increase had been most marked in Italy.

I have prepared a return showing the proportion of insane persons to every 1,000 of the population in England, Scotland, New South Wales, and Victoria, in each year since 1861, and in South Australia in each year since 1871:—

NUMBER OF INSANE TO 1,000 OF THE POPULATION.

Year.	England.	Scotland.	New South Wales.	Victoria.	South Australia.
1861	2·01	2·05	2·34	1·29	....
1862	2·09	2·08	....	1·34	....
1863	2·15	2·04	2·45	1·49	....
1864	2·19	2·04	2·50	1·65	....
1865	2·24	2·05	2·52	1·68	....
1866	2·29	2·08	2·58	1·84	....
1867	2·35	2·11	2·58	1·94	....
1868	2·43	2·14	2·63	2·27	....
1869	2·48	2·18	2·53	2·40	....
1870	2·50	2·23	2·57	2·55	....
1871	2·53	2·27	2·67	2·71	1·74
1872	2·58	2·28	2·67	2·94	1·73
1873	2·62	2·30	2·72	2·96	1·80
1874	2·66	2·29	2·72	3·04	1·71
1875	2·68	2·31	2·80	3·10	1·90
1876	2·71	2·38	2·77	3·14	1·89
1877	2·75	2·45	2·76	3·19	2·01
1878	2·77	2·50	2·76	3·27	2·03
1879	2·79	2·55	2·74	3·41	2·05
1880	....	2·58	2·72*	....	2·19

* Or corrected by Census of April 3, 1881, 2·85.

With reference to the Colony of New South Wales, so gradual, and yet so marked, had been the increase in the proportion of insane to population for some years past that, on receiving the

Registrar General's estimates of population for 1879 and 1880, and especially for the latter year, and finding that, calculated on these, the proportion of insane was diminishing instead of increasing, I at once felt and expressed some doubt as to the accuracy of the estimates. That these doubts were not unreasonable is proved by the Census showing the population to be less by about 22,000 than the estimate for 1880. The proportion of insane has therefore increased from 2·34 to 2·85, and not 2·72 per 1,000.

The whole of the statistics now before you prove beyond a doubt that the amount of known and registered insanity has greatly increased, that the great wave of registered insanity is still slowly advancing, but that, taking the last twenty years, the advance had been less during the last than during the first decade, and that the increase is at a declining rate.

The statistics, indeed, have at first sight a very formidable and alarming appearance; but the very greatness of the increase might well raise a suspicion that it has not been due mainly to an increased production of insanity. However we may regard the history of the last half-century, it has not differed so much from that of former times as to cause such an increase.

The English, Scotch, and Irish Commissioners in Lunacy, with the statistics of the United Kingdom before them, are at one in believing the increase to be due to other causes than an increasing amount of mental disease. The English Commissioners, in their 15th report, state: "We have not found any reasons supporting the opinion generally entertained that the community are more subject than formerly to attacks of insanity," and in all recent reports they have attributed the increase to other causes.

The Scotch Commissioners, in their 22nd report, that for 1879, state: "The increase, as we have frequently pointed out, is not necessarily due to an increasing amount of mental disease"; and the Irish Inspectors, in their 29th report, also for 1879, "see no reason to suppose that lunacy is actually on the increase."

Dr. Lockhart Robertson, now one of the Lord Chancellor's Visitors in Lunacy, having some years ago passed in review the statistics then collected, pronounced the alleged increase of insanity a "popular fallacy," and in two admirable papers read before the Medico-Psychological Society in 1869, set forth his reasons for this opinion.

The reasons generally given for the great increase of recognised insanity are as follows:—

1. That more stringent regulations have been made for the protection and registration of insane persons, whereby many who were never officially heard of at one time are now duly counted.

In 1845 an Act was passed in England obliging the counties to build asylums. The opening of these forms a new era in the

history of insanity, and since this date the whole machinery of the Lunacy Commissioners has had its origin. In 1853 an Act ordered a quarterly return of lunatics not in asylums, and in 1861 an Act rendered lunatics chargeable to the Union instead of the parish funds, relieved guardians from a fear of burthening their own parish rates, and led to the placing of many idiots, formerly at home, in the county asylums.

In 1874 a grant of 4s. a head per week was made from the Consolidated Revenue to the county administration for every lunatic, and this has caused the shifting of no inconsiderable number of the aged and demented from the pauper to the lunatic list.

Coincident with these changes in England there have been similar enactments in Scotland, Ireland, France, and other countries. In the Australian Colonies the law has humanely afforded easy modes of admission to Institutions for the Insane, which the authorities of Benevolent Asylums and Poor-houses have not been slow to take advantage of, so as to rid themselves of a large number of demented cases, and especially of all who require the slightest extra care, food, or watching. This has been markedly the case since a closer scrutiny has been made of the expenditure of these public or quasi-public institutions.

2. The accumulation of incurable cases and the lower rate of mortality.

Formerly the insane succumbed in large numbers from neglect or cruelty, whilst now under asylum care they live to a fair, and often to an advanced age.

To show the effect of a low death rate on the increase of insanity by causing an accumulation of old and chronic cases, and by way of illustrating one of the causes for the more rapid increase of the proportion of insane persons in the Australian Colonies than in Great Britain, I would call your attention to the difference made even in small numbers by the English and Australian death rate. The number who are discharged either recovered or so far well as to be able to leave asylum care, does not greatly differ in the two countries, and may be set down as 60 per cent. of the admissions. The English death rate averages over 10 per cent., the Australian, thus far, under 7 per cent. of the average number resident. In Great Britain, then, in an asylum with an average number resident of 1,000, and an admission rate of 300 per annum, we have 100 deaths and 180 discharges, a total of 280 per annum, leaving an annual increase of 20 only; whilst in an Australian asylum, of the same capacity and receiving the same number of new cases, we have only 70 deaths and 180 discharges, or 250 per annum, leaving an annual increase of 50, or 150 per cent. greater than Great Britain. The reasons for the smaller mortality in Australian asylums heretofore are, first—that the inmates, many of whom enter young, have not had time to grow old with the asylums;

and second—that the mild climate tends to lengthen the lives of asylum inmates, who, in Great Britain, unwittingly expose themselves to cold, and die of pneumonia, bronchial and other affections.

3. The improved management of asylums.

Formerly they were objects of dread, in which persons would not and did not place the insane of their families, whereas now these prejudices have for the most part vanished, and asylums are considered fit homes for the perturbed or weak in intellect. The very increase in the number of asylums has served to produce an apparent increase of insanity. The number of patients drawn from the immediate neighbourhood of an asylum is always greater in proportion to population than from places more distantly situated, and every new asylum attracts to its wards patients from the immediate neighbourhood, whom distance, prejudice, or ignorance has kept from those more distantly situated.

Since the establishment of the Newcastle Asylum, in this Colony, in 1871, the number of idiots under care has exactly doubled, whilst the population has, as before stated, increased only 44 per cent. It cannot be supposed that there has been this enormous increase of idiocy; but this special institution has become known, and patients formerly kept at home or in benevolent and other institutions have been sent thither. On one occasion 18 patients were sent at once from the Sydney Benevolent Institution, some of whom had been for a long time inmates.

4. An alteration has taken place in the standard of what constitutes insanity.

It has been said that modern science has discovered new realms of lunacy, and there is certainly a growing conviction that the disease should be dealt with in a special manner. Former generations were less particular than ourselves in accurately distinguishing the boundaries of reason and madness. Unless a man took to crowning himself with straw, or declaring himself an emperor or a teapot, they held him to be sane enough for practical purposes, they hanged him if he committed a murder, and, if we may judge from the quaint literature of former days, they published his books if his mania took a literary instead of a homicidal form; whereas, now there is a growing disinclination to tolerate irregularities of conduct, and those whose insanity was not in former times detected, stand but scant chance of escaping enumeration, if they are not absolutely consigned to association with the insane.

Years ago every village had its fool or "softy," and numbers of the harmless insane were at large earning, wholly or in part, their own living, and tolerated by those about them; but for years there has been a growing tendency to send to asylums the imbecile and feeble-minded—"the finer touch of a finikin civilization shrinking from the contact of imperfect fellow-creatures."

These are the causes given for the increase in the amount of registered insanity which has taken place, and it must at once be admitted that they do account for a large share of it. Whether they account for all is, I think, very doubtful.

A suspicion arises that some of these causes ought, at all events in old and settled countries, before this time to have become inoperative. The highest possible extension of lunatic life under asylum care should long ere this have been reached in England, and in all parts of Great Britain asylums of every kind have long since been brought within easy reach of the whole population.

Again, the number of cases of insanity occurring, or what has been called the "annual incidence of fresh cases," is a better guide to the prevalence of insanity than the number existing, because the increase resulting from accumulation is eliminated, but the following return shows that the ratio of admissions to population is increasing, somewhat slowly indeed in England, but more rapidly in this Colony and South Australia.

RETURN showing the ratio of admissions to the population, or the annual incidence of fresh cases of insanity in England, New South Wales, and South Australia. (The transfers are excluded.)

Year.	England.	New South Wales.	South Australia.
1863	....	1 in 2,026	....
1864	....	1 „ 1,973	....
1865	....	1 „ 2,260	....
1866	....	1 „ 2,201	....
1867	....	1 „ 2,473	....
1868	....	1 „ 2,093	....
1869	....	1 „ 1,831	....
1870	1 in 2,182	1 „ 1,987	....
1871	1 „ 2,128	1 „ 1,523	1 in 1,672
1872	1 „ 2,141	1 „ 1,779	1 „ 2,112
1873	1 „ 2,050	1 „ 1,638	1 „ 1,888
1874	1 „ 1,954	1 „ 1,770	1 „ 1,930
1875	1 „ 1,895	1 „ 1,704	1 „ 1,366
1876	1 „ 1,853	1 „ 1,749	1 „ 1,514
1877	1 „ 1,864	1 „ 1,449	1 „ 1,273
1878	1 „ 1,831	1 „ 1,636	1 „ 1,225
1879	1 „ 1,893	1 „ 1,668	1 „ 1,330
1880	....	1 „ 1,618	1 „ 1,200

Again, we are well aware that there has been a marked increase in more than one form of insanity during the last forty years, but we cannot point to any form which has become less frequent. General paralysis, of which I have in a former paper written at length, may be described as essentially a disease of this generation. Forty years ago it was practically unknown; now it is a common affection. I can point out about 40 cases in the asylums of this Colony, and it is even more common in the Mother Country. No less than

1,034 cases of it, or upwards of 7 per cent. of the total admissions, were received into English asylums in 1879; whilst in France we have the statement of M. Lunier, the Inspector-General of Asylums, that "it appears to increase not only in the large towns, but in the smaller centres of population, with the most alarming rapidity."

There is good reason to think that epileptic insanity is also on the increase. 1,226 cases of this affection were admitted into English asylums in 1879, forming upwards of 9 per cent. of the total admissions for that year.

If you will, as medical practitioners, recall your own experience, or consult the literature of the subject, you cannot, I think, fail to perceive that the so-called neurotic diseases, which, though distinct from, are allied to insanity, have greatly increased in these later years. The different forms of spinal affection and paralysis, locomotor ataxia, neuralgia, hysteria, chorea, epilepsy, habitual headache and nervous instability, and exhaustion, are to be seen in every consulting room, are the subjects of a large and increasing literature, and are treated in special hospitals. Between the sufferers from these diseases and insanity proper, between the inner circle of insane and an outer circle of neurotics, come, as has been pointed out by Dr. Crichton Brown in a charmingly written paper in the Journal of Psychological Medicine for July, 1880, the numerous crazy folks forming the middle of three concentric circles. These believers in perpetual motion, in squaring the circle, in spiritualism and clairvoyance, and other follies, are separated from the insane by arbitrary and somewhat shifting lines, and were surely never so numerous as at this time.

I need not tell you how the dwellers in the two outer of these concentric circles pass from time to time into the inner one, and how the neuroses lead up to or develop into insanity in a second or third generation. "The neuroses of one generation are indeed not rarely the insaniæ of the next," and if the neurotic and crazy circles are enlarging out of proportion to the increase of population, the insane circle to which they act as feeders is probably increasing in a similar manner.

Of the causes of the increase of nervous diseases I do not now propose to speak, except to indicate that it appears largely due to the pressure and competition, the restlessness and social upheaval of modern life. The condition of the poorer has changed much more than that of the monied classes, and they have entered into a new political and educational life, with its special excitements and struggles. Can it be that the increased amount of nervous disease and insanity is one of the penalties of this social and intellectual progress, this greater brain activity and strain, which has come in almost too hot haste?

Some figures in the last reports of the English and Scotch Lunacy Commissioners would seem to point to this. The amount

of insanity among the poorer classes has increased in much greater proportion than among the well-to-do classes of the community. In Scotland, "after making allowance for the increased population of the country, the number in private asylums has, since 1858, increased 12 per cent., whilst the number in pauper asylums has increased 82 per cent." (Report of Lunacy Commissioners, Scotland, 1880.)

In England from 1858 to 1879 the number of private patients increased from 4,980 to 7,620, or 53 per cent., whilst the pauper patients increased from 31,782 to 63,571, or 100 per cent. For several years past there has been no increase in the proportion of private patients, but this proportion of pauper patients is still increasing.

Dr. George M. Beard, of New York, whilst discussing the augmentation of the numbers of the insane, and the development of novel symptoms and forms of insanity, says, "Insanity is a part of the cost of liberty—it is a tax on our freedom. Where the sane are oppressed, the number of the insane has never been large. Liberty implies responsibility, responsibility leads to worry, and worry is attended with disappointment. If we think for ourselves, and govern ourselves, thousands must go down in the struggle."

On the whole, then, looking at the annual incidence of fresh cases, at the increase in special forms of insanity, at the spread of neurotic mischief, and at a constantly increasing proportion of insane to population, I think the question propounded at the commencement of this paper must be answered in the affirmative. There is good reason to believe that there is some real increase of "occurring" insanity.

It is, however, to some extent, comforting to know the increase is everywhere at a declining rate.

APPENDIX.

ABSTRACT OF THE METEOROLOGICAL OBSERVATIONS TAKEN AT THE SYDNEY OBSERVATORY.

GOVERNMENT OBSERVATORY, SYDNEY.

LATITUDE, 33° 51′ 41″; LONGITUDE, 10h 4m 50·81s; MAGNETIC VARIATION, 9° 35′ 37″ East.

JANUARY, 1881.—GENERAL ABSTRACT.

Barometer At 32° Faht.	Highest Reading...	... 30·084 inches on the 6th, at 8 a.m.
	Lowest Reading ...	... 29·328 inches on the 1st, at 3·50 p.m.
	Mean Height ...	... 29·753.

(Being 0·017 less than that in the same month on an average of the preceding 22 years.)

Wind	Greatest Pressure	... 25·2 lbs. on the 20th.
	Mean Pressure ...	... 1·0 lb.
	Number of Days Calm	... 0
	Prevailing Direction	... E.N.E.

(Prevailing direction during the same month for the preceding 22 years, E.N.E.)

Temperature	Highest in the Shade	... 89·7 on the 20th.
	Lowest in the Shade	... 56·7 on the 14th.
	Greatest Range ...	... 20·6 on the 20th.
	Highest in the Sun	... 152·7 on the 10th.
	Lowest on the Grass	... 53·4 on the 6th.
	Mean Diurnal Range	... 11·4
	Mean in the Shade	... 69·9

(Being 1·5 less than that of the same month on an average of the preceding 22 years.

Humidity ...	Greatest Amount	... 99·0 on the 24th.
	Least	... 51·0 on the 8th.
	Mean	... 75·0

(Being 2·5 less than that of the same month on an average of the preceding 22 years.)

Rain	Number of Days ...	... 18 rain and 5 dew.
	Greatest Fall ...	... 1·319 inches on the 15th.
	Total Fall... ...	... { 1·781 " 65 feet above ground.
		{ 2·843 " 15 in. above ground.

(Being 0·664 inches less than that of the same month on an average of the preceding 22 years.)

Evaporation	Total Amount ...	... 4·623 inches.
Electricity ...	Number of Days Lightning	5
Cloudy Sky ...	Mean Amount ...	... 7·5
	Number of Clear Days	... 0
Meteors ...	Number observed	... 0

Remarks.

The barometer this month has been very near the average; the lowest reading, 29·472, was recorded at 3·50 p.m. on the 1st, which was the lowest reading in a depression which passed Eucla on 29th December. The mean shade temperature was 1·5 less than the average for the month, and the rainfall at Sydney was 0·664 less than the average; in the country—the northern stations, the high land, and the south-west parts of the Colony had an abundant rainfall; other parts had a short supply.

GOVERNMENT OBSERVATORY, SYDNEY.

LATITUDE, 33° 51′ 41″; LONGITUDE, $10^h\ 4^m\ 50{\cdot}81^s$; MAGNETIC VARIATION, 9° 35′ 37″ East.

FEBRUARY, 1881.—GENERAL ABSTRACT.

Barometer ... At 32° Faht.	Highest Reading	30·204 inches on the 14th, at 8·30 a.m.
	Lowest Reading	29·271 „ on the 13th, at 2·40 p.m.
	Mean Height	29·842
(Being 0·068 greater than that in the same month on an average of the preceding 22 years.		
Wind	Greatest Pressure ...	17·4 lbs. on the 7th.
	Mean Pressure	0·8 lb.
	Number of Days Calm ...	2
	Prevailing Direction ...	N.E.
(Prevailing direction during the same month for the preceding 22 years, S.)		
Temperature	Highest in the Shade ...	100·5 on the 13th.
	Lowest in the Shade ...	57·4 on the 7th.
	Greatest Range	31·8 on the 13th.
	Highest in the Sun ...	151·9 on the 13th.
	Lowest on the Grass ...	55·4 on the 27th.
	Mean Diurnal Range ...	11·7
	Mean in the Shade ...	70·2
(Being 0·6 less than that of the same month on an average of the preceding 22 years.)		
Humidity ...	Greatest Amount ...	98·0 on the 4th.
	Least	54·0 on the 16th.
	Mean	76·3
(Being 1·3 greater than that of the same month on an average of the preceding 22 years.)		
Rain	Number of Days	11 rain and 5 dew.
	Greatest Fall	1·155 inches on the 25th.
	Total Fall... ...	2·597 „ 65 ft. above ground.
		3·894 „ 15 in. above ground.
(Being 2·583 inches less than that of the same month on an average of the preceding 22 years.)		
Evaporation	Total Amount	3·865 inches.
Electricity ...	Number of Days Lightning	4
Cloudy Sky ...	Mean Amount	7·1
	Number of Clear Days ...	2
Meteors	...Number observed ...	3

Remarks.

The mean temperature in the shade has been 0·6 below the average; but some days have been very hot, and on the 13th the maximum reached 100·5. At the beginning of the month the weather was very unsettled, and at Fiji a hurricane occurred on the 2nd; from that date to the 7th a light general rain fell in this Colony. The totals for the month indicate a supply of rain less than the requirements of the season. A few places, for instance Mount Victoria and Kurrajong, had heavy rains—at the former 10·83 inches. It is worth noting that the total rainfall for the first two months of 1881 is below the average of the same period in previous years; at Sydney, for instance, the total for January and February is 6·74 inches, while the average is 9·33 inches.

GOVERNMENT OBSERVATORY, SYDNEY.

LATITUDE, 33° 51′ 41″; LONGITUDE, 10h 4m 50·81s; MAGNETIC VARIATION, 9° 35′ 37″ EAST.

MARCH, 1881.—GENERAL ABSTRACT.

Barometer ... At 32° Faht.	Highest Reading... ...	30·191 inches on the 21st, at 8·30 a.m.
	Lowest Reading	29·396 „ on the 8th, at 6·25 p.m.
	Mean Height	29·910

(Being 0·020 greater than that in the same month on an average of the preceding 22 years.)

Wind	Greatest Pressure ...	13·0 lbs. on the 5th.
	Mean Pressure	0·4 lb.
	Number of Days Calm ...	2
	Prevailing Direction ...	N.E.

(Prevailing direction during the same month for the preceding 22 years, N.E.)

Temperature	Highest in the Shade ...	86·1 on the 31st.
	Lowest in the Shade ...	54·5 on the 10th.
	Greatest Range	24·2 on the 15th.
	Highest in the Sun ...	137·2 on the 24th.
	Lowest on the Grass ...	50·2 on the 10th.
	Mean Diurnal Range ...	12·9
	Mean in the Shade ...	70·0

(Being 0·7 greater than that of the same month on an average of the preceding 22 years.)

Humidity ...	Greatest Amount ...	98·0 on the 7th.
	Least	48·0 on the 9th.
	Mean	77·5

(Being 0·8 greater than that of the same month on an average of the preceding 22 years.)

Rain	Number of Days	10 rain and 9 dew.
	Greatest Fall	1·184 inches on the 9th.
	Total Fall...	1·007 „ 65 feet above ground.
		2·653 „ 15 in. above ground.

(Being 2·579 inches less than that of the same month on an average of the preceding 22 years.)

Evaporation	Total Amount	3·663 inches.
Electricity ...	Number of Days Lightning	11
Cloudy Sky ...	Mean Amount	5·1
	Number of Clear Days ...	2
Meteors ...	Number observed ...	4

Remarks.

At Sydney the mean shade temperature has been 0·7 greater than the average, and the rainfall 2·579 less than the average for this month. In the country the rainfall this month has not been uniform, many of the stations having had but a short supply, and others an abundant one. Speaking generally, the south-east districts have had an abundant rainfall, and the south-west rather dry. The temperature during the month, though not high, was very oppressive, owing to the amount of moisture in the air and prevalent easterly winds.

GOVERNMENT OBSERVATORY, SYDNEY.

LATITUDE, 33° 51′ 41″; LONGITUDE, 10h 4m 50·61s; MAGNETIC VARIATION, 9° 35′ 37″ East.

APRIL, 1881.—GENERAL ABSTRACT.

Barometer ... At 32° Faht.	Highest Reading... ...	30·351 inches on the 30th, at 8·30 a.m.
	Lowest Reading	29·576 „ on the 13th, at 5·10 a.m.
	Mean Height	30·010.

(Being 0·080 greater than that in the same month on an average of the preceding 22 years.)

Wind	Greatest Pressure ...	20·5 lbs. on the 9th.
	Mean Pressure	0·6 lb.
	Number of Days Calm ...	2
	Prevailing Direction ...	N.E.

(Prevailing direction during the same month for the preceding 22 years, W.)

Temperature	Highest in the Shade ...	86·9 on the 9th.
	Lowest in the Shade ...	50·7 on the 30th.
	Greatest Range	24·1 on the 9th.
	Highest in the Sun ...	141·9 on the 9th.
	Lowest on the Grass ...	45·2 on the 16th.
	Mean Diurnal Range ...	12·2
	Mean in the Shade ...	63·8

(Being 1·1 less than that of the same month on an average of the preceding 22 years.)

Humidity ...	Greatest Amount ...	98·0 on the 11th.
	Least	39·0 on the 14th.
	Mean	78·6

(Being 1·2 greater than that of the same month on an average of the preceding 22 years.)

Rain	Number of Days	14 rain and 12 dew.
	Greatest Fall	2·298 inches on the 11th.
	Total Fall	4·269 „ 65 feet above ground.
		5·363 „ 15 in. above ground.

(Being 1·214 inches less than that of the same month on an average of the preceding 22 years.)

Evaporation	Total Amount	2·338 inches.
Electricity ...	Number of Days Lightning	3
Cloudy Sky ...	Mean Amount	4·5
	Number of Clear Days ...	2
Meteors ...	Number observed ...	4

Remarks.

Barometer this month—30·010—was 0·080 higher than the average, and the mean temperature 1·1 less than the average. It is remarkable that the prevailing wind has been N.E., whereas the usual direction for this month has been W. The heaviest rainfall was at Sydney—5·363; in the country there has been very little rain this month,—out of 137 stations reporting, 36 had no rain at all, and only 20 had more than an inch, and these were all coast or mountain stations.

GOVERNMENT OBSERVATORY, SYDNEY.

LATITUDE, 33° 51′ 41″; LONGITUDE, 10h 4m 50·81s; MAGNETIC VARIATION, 9° 35′ 37″ East.

MAY, 1881.—GENERAL ABSTRACT.

Barometer ... At 32° Faht.	Highest Reading... ...	30·359 inches on the 1st, at 10 a.m.
	Lowest Reading	29·456 „ on the 30th, at 7·12 a.m.
	Mean Height	29·975

(Being 0·069 greater than that in the same month on an average of the preceding 22 years.)

Wind	Greatest Pressure ...	18·6 lbs. on the 30th.
	Mean Pressure	0·6 lb.
	Number of Days Calm ...	0
	Prevailing Direction ...	W.

(Prevailing direction during the same month for the preceding 22 years, W.)

Temperature	Highest in the Shade ...	76·1 on the 9th.
	Lowest in the Shade ...	44·5 on the 26th.
	Greatest Range	21·4 on the 13th.
	Highest in the Sun ...	121·2 on the 1st.
	Lowest on the Grass ...	39·3 on the 26th.
	Mean Diurnal Range ...	12·7
	Mean in the Shade ...	60·5

(Being 2·1 greater than that of the same month on an average of the preceding 22 years.)

Humidity ...	Greatest Amount ...	98·0 on the 31st.
	Least	41·0 on the 9th.
	Mean	78·2

(Being 2·1 greater than that of the same month on an average of the preceding 22 years.)

Rain	Number of Days... ...	14 rain and 11 dew.
	Greatest Fall	1·023 inches on the 29th.
	Total Fall... ...	2·183 „ 65 ft. above ground.
		3·702 „ 15 in. above ground.

(Being 1·549 inches less than that of the same month on an average of the preceding 22 years.)

Evaporation	Total Amount	1·628 inches.
Electricity ...	Number of Days Lightning	2
Cloudy Sky ...	Mean Amount	6·3
	Number of Clear Days ...	5
Meteors ...	Number observed ...	0

Remarks.

The temperature this month has been 2·1 greater than the average; the barometer has also been high—0·069 above the average. There has been a general but not heavy rainfall; the heaviest—6·10 inches—was at Milton, and next to that 5·97 inches at Gosford. The weather has been fine and cold, in most cases too fine for those who are looking for a supply of water.

GOVERNMENT OBSERVATORY, SYDNEY.

LATITUDE, 33° 51′ 41″; LONGITUDE, $10^h\ 4^m\ 50{\cdot}81^s$; MAGNETIC VARIATION, 9° 35′ 37″ East.

JUNE, 1881.—GENERAL ABSTRACT.

Barometer ... At 32° Faht.	Highest Reading... ...	30·267 inches on the 27th, at 11 a.m.
	Lowest Reading	29·229 „ on the 3rd, at 12·30 a.m.
	Mean Height	29·839

(Being 0·065 less than that in the same month on an average of the preceding 22 years.)

Wind	Greatest Pressure ...	18·6 lbs. on the 3rd.
	Mean Pressure	1·2 lb.
	Number of Days Calm ...	0
	Prevailing Direction ...	W.

(Prevailing direction during the same month for the preceding 22 years, W.

Temperature	Highest in the Shade ...	66·1 on the 1st.
	Lowest in the Shade ...	39·6 on the 28th.
	Greatest Range	20·5 on the 28th.
	Highest in the Sun ...	110·3 on the 1st.
	Lowest on the Grass ...	32·7 on the 28th.
	Mean Diurnal Range ...	11·8
	Mean in the Shade ...	52·9

(Being 1·5 less than that of the same month on an average of the preceding 22 years.)

Humidity ...	Greatest Amount... ...	98·0 on the 13th.
	Least	43·0 on the 28th.
	Mean	74·5

(Being 2·2 less than that of the same month on an average of the preceding 22 years.)

Rain	Number of Days	15 rain and 2 dew.
	Greatest Fall	2·356 inches on the 10th.
	Total Fall...	{ 2·234 „ 65 feet above ground.
		{ 3·957 „ 15 in. above ground.

(Being 1·431 inches less than that of the same month on an average of the preceding 22 years.)

Evaporation	Total Amount	1·755 inches.
Electricity ...	Number of Days Lightning	1
Cloudy Sky ...	Mean Amount	4·8
	Number of Clear Days ...	1
Meteors ...	Number observed ...	0

Remarks.

The temperature this month has been 1·5 degree below the average, the lowest shade (39·6) being reached on the 28th on the grass; the temperature on the same night fell to 32·7. At 156 stations scattered over the greater part of the Colony the weather this month has been generally very dry; 67 stations report less than one inch of rain. A few of the coast and high land stations have had a good supply, the highest being 5·48 inches at Orange and 5·41 at Port Stephens.

GOVERNMENT OBSERVATORY, SYDNEY.

LATITUDE, 33° 51′ 41″; LONGITUDE, 10h 4m 50·81s; MAGNETIC VARIATION, 9° 35 37″ East.

JULY, 1881.—GENERAL ABSTRACT.

Barometer ... At 32° Faht.	Highest Reading... ...	30·379 inches on the 19th, at 10 a.m.
	Lowest Reading	29·693 „ on the 15th, at 4 p.m.
	Mean Height	30·082

(Being 0·044 greater than that in the same month on an average of the preceding 22 years.)

Wind... ...	Greatest Pressure ...	13·5 lbs. on the 12th.
	Mean Pressure	0·8 lbs.
	Number of Days Calm ...	0
	Prevailing Direction ...	W.

(Prevailing direction during the same month for the preceding 22 years, W.)

Temperature	Highest in the Shade ...	65·4 on the 6th.
	Lowest in the Shade ...	40·0 on the 25th.
	Greatest Range	21·4 on the 4th and 15th.
	Highest in the Sun ...	107·5 on the 31st.
	Lowest on the Grass ...	33·8 on the 25th.
	Mean Diurnal Range ...	14·0
	Mean in the Shade ...	51·2

(Being 1·2 less than that of the same month on an average of the preceding 22 years.)

Humidity ...	Greatest Amount ...	100·0 on the 8th and 15th.
	Least	50·0 on the 16th.
	Mean	81·1

(Being 6·1 greater than that of the same month on an average of the preceding 22 years.)

Rain	Number of Days... ...	13 rain and 4 dew.
	Greatest Fall	0·980 inches on the 11th.
	Total Fall... ...	1·546 „ 65 ft. above ground.
		2·470 „ 15 in. above ground.

(Being 1·804 inches less than that of the same month on an average of the preceding 22 years.)

Evaporation	Total Amount	1·315 inches.
Electricity ...	Number of Days Lightning	0
Cloudy Sky ...	Mean Amount	3·3
	Number of Clear Days ...	8
Meteors ...	Number observed ...	1

Remarks.

The month has been cold, the mean temperature 1·2 below the average, and the lowest shade down to 40·0, on the grass to 33·8 in Sydney. The rainfall has been low, 1·804 below the average. Generally the weather this month has been cold and fine, and withal very dry, excepting just the coast district from Sydney to Port Macquarie, over part of which heavy rain fell; it was hardest about Port Stephens, where 11·60 inches were recorded, and next Newcastle, with 7·95 inches. The extreme dryness of the month will be indicated by the fact that out of 144 stations only 13 received more than one inch, while 11 had no rain at all, and 13 others had less than 0·10 inches.

GOVERNMENT OBSERVATORY, SYDNEY.

LATITUDE, 33° 51′ 41″; LONGITUDE, 10h 4m 50·81s; MAGNETIC VARIATION, 9° 35′ 37″ East.

AUGUST, 1881.—GENERAL ABSTRACT.

Barometer ...	Highest Reading... ...	30·368 inches on the 6th at 10 a.m.
At 32° Faht.	Lowest Reading	29·652 „ on the 27th, at 2 p.m.
	Mean Height	29·968

(Being 0·031 greater than that in the same month on an average of the preceding 22 years.)

Wind	Greatest Pressure ...	21·1 lbs. on the 22nd.
	Mean Pressure	0·7 lb.
	Number of Days Calm ...	0
	Prevailing Direction ...	W.

(Prevailing direction during the same month for the preceding 22 years, W.)

Temperature	Highest in the Shade ...	77·0 on the 27th.
	Lowest in the Shade ...	41·2 on the 7th.
	Greatest Range	26·3 on the 7th.
	Highest in the Sun ...	122·1 on the 27th.
	Lowest on the Grass ...	32·0 on the 11th.
	Mean Diurnal Range ...	15·6
	Mean in the Shade ...	54·8

(Being same as that of the same month on an average of the preceding 22 years.)

Humidity ...	Greatest Amount ...	100·0 on the 1st, 22nd, 24th, and 29th.
	Least	49·0 on the 12th.
	Mean	79·6

(Being 7·9 greater than that of the same month on an average of the preceding 22 years.)

Rain	Number of Days	10 rain and 3 dew.
	Greatest Fall	1·673 inches on the 23rd.
	Total Fall...	2·024 „ 65 ft. above ground.
		3·151 „ 15 in. above ground.

(Being 0·123 inches greater than that of the same month on an average of the preceding 22 years.)

Evaporation	Total Amount	1·254 inches.
Electricity ...	Number of Days Lightning	3
Cloudy Sky ...	Mean Amount	4·1
	Number of Clear Days ...	5
Meteors ...	Number observed ...	0

Remarks.

The month has been cool, but on the 27th the temperature in shade rose to 77·0 at Sydney. The rains this month have been generally very light, only 45 stations recorded over 2 inches, and most of these belong to the coast districts. Inland the fall has been very small—Bourke reports only 0·19 in.

GOVERNMENT OBSERVATORY, SYDNEY.

LATITUDE, 33° 51′ 41″; LONGITUDE 10h 4m 50·81s; MAGNETIC VARIATION, 9° 35′ 37″ East.

SEPTEMBER, 1881.—GENERAL ABSTRACT.

Barometer ... At 32° Faht.	Highest Reading	30·355 on the 7th, at 12 p.m.
	Lowest Reading	29·398 on the 3rd, at 2·23 a.m.
	Mean Height	29·884

(Being 0·011 greater than that in the same month on an average of the preceding 22 years.)

Wind	Greatest Pressure ...	19·8 lbs. on the 4th and 5th.
	Mean Pressure	1·1 lb.
	Number of Days Calm ...	0
	Prevailing Direction ...	S.

(Prevailing direction during the same month for the preceding 22 years, W.)

Temperature	Highest in the Shade ...	77·2 on the 18th.
	Lowest in the Shade ...	42·0 on the 6th.
	Greatest Range	24·4 on the 3rd.
	Highest in the Sun ...	130·0 on the 18th.
	Lowest on the Grass ...	34·0 on the 6th.
	Mean Diurnal Range ...	13·7
	Mean in the Shade ...	58·1

(Being 0·7 less than that of the same month on an average of the preceding 22 years.)

Humidity ...	Greatest Amount ...	92·0 on the 15th.
	Least	46·0 on the 4th.
	Mean	72·0

(Being 0·2 greater than that of the same month on an average of the preceding 22 years.)

Rain	Number of Days	15 rain and 1 dew.
	Greatest Fall	0·760 inches on the 16th.
	Total Fall...	1·904 „ 65 ft. above ground.
		3·274 „ 15 in. above ground.

(Being 0·073 less than that of the same month on an average of the preceding 22 years.)

Evaporation	Total Amount	1·744 inches.
Electricity ...	Number of Days Lightning	2
Cloudy Sky ...	Mean Amount	5·1
	Number of Clear Days ...	2
Meteors ...	Number observed ...	0

Remarks.

The temperature this month was 0·7 below the average, and the maximum for this month, 77·2, is almost exactly the same as that of last month. At the coast stations, and on the high lands, a sufficient supply of rain for the month is reported, the greatest amount being 12·83 at Port Macquarie. West of the mountains the amount is from 2 inches downwards, to half an inch in the west. Places on the Lower Darling have had as much as 2 inches.

GOVERNMENT OBSERVATORY, SYDNEY.

LATITUDE, 33° 51′ 41″; LONGITUDE, 10h 4m 50·81s; MAGNETIC VARIATION, 9° 35′ 37″ East.

OCTOBER, 1881.—GENERAL ABSTRACT.

Barometer ... At 32° Faht.	Highest Reading... ...	30·239 on the 28th, at 10 a.m.
	Lowest Reading	29·215 on the 18th, at 4 p.m.
	Mean Height	29·818

(Being 0·019 less than that in the same month on an average of the preceding 22 years.

Wind	Greatest Pressure ...	40·5 lbs. on the 18th.
	Mean Pressure	1·0 lb.
	Number of Days Calm ...	0
	Prevailing Direction ...	S.

(Prevailing direction during the same month for the preceding 22 years, N.E.)

Temperature	Highest in the Shade ...	85·8 on the 10th.
	Lowest in the Shade ...	46·0 on the 23rd.
	Greatest Range	27·0 on the 9th.
	Highest in the Sun ...	149·0 on the 31st.
	Lowest on the Grass ...	40·7 on the 9th.
	Mean Diurnal Range ...	14·2
	Mean in the Shade ...	59·8

(Being 3·7 less than that of the same month on an average of the preceding 22 years.)

Humidity ...	Greatest Amount... ...	95·0 on the 18th.
	Least	57·0 on the 4th.
	Mean	73·3

(Being 4·6 greater than that of the same month on an average of the preceding 22 years.)

Rain	Number of Days	16 rain, 2 dew.
	Greatest Fall	4·246 inches on the 19th.
	Total Fall...	3·716 „ 65 ft. above ground. 6·534 „ 15 in. above ground.

(Being 3·742 inches greater than that of the same month on an average of the preceding 22 years.)

Evaporation	Total Amount	2·283 inches.
Electricity ...	Number of Days Lightning	5
Cloudy Sky ...	Mean Amount	5·3
	Number of Clear Days ...	4
Meteors ...	Number observed ...	2

Remarks.

There was a great fall in temperature, reaching its minimum 47·7 on the 5th, and a second going down to 46·0 on the 23rd, the mean temperature for the month being 3·7 less than the average. Very heavy rain fell on the 18th at Sydney. The coast and high land districts have had abundant rains this month, but in the western districts generally the rainfall has been light, and in some parts no rain at all fell.

GOVERNMENT OBSERVATORY, SYDNEY.

LATITUDE, 33° 51′ 41″; LONGITUDE, 10h 4m 50·81s; MAGNETIC VARIATION, 9° 35′ 37″ East.

NOVEMBER, 1881.—GENERAL ABSTRACT.

Barometer ... At 32° Faht.	Highest Reading	30·114 on the 7th, at 10 a.m.
	Lowest Reading	29·316 on the 24th, at 10 a.m.
	Mean Height	29·716

(Being 0·080 less than that in the same month on an average of the preceding 22 years.)

Wind	Greatest Pressure ...	23·8 lbs. on the 28th.
	Mean Pressure	1·0 lb.
	Number of Days Calm ...	0
	Prevailing Direction ...	S.

(Prevailing direction during the same month for the preceding 22 years, S.)

Temperature	Highest in the Shade ...	89·4 on the 4th.
	Lowest in the Shade ...	51·6 on the 6th.
	Greatest Range	27·4 on the 4th.
	Highest in the Sun ...	147·2 on the 4th.
	Lowest on the Grass ...	45·3 on the 8th.
	Mean Diurnal Range ...	14·1
	Mean in the Shade ...	65·5

(Being 1·1 less than that of the same month on an average of the preceding 22 years.)

Humidity ...	Greatest Amount ...	99·0 on the 15th.
	Least	27·0 on the 24th.
	Mean	73·6

(Being 4·0 greater than that of the same month on an average of the preceding 22 years.)

Rain	Number of Days... ...	17 rain and 1 dew.
	Greatest Fall	0·448 inches on the 21st.
	Total Fall...	{ 0·879 „ 65 ft. above ground.
		{ 1·538 „ 15 in. above ground.

(Being 1·872 inches less than that of the same month on an average of the preceding 22 years.)

Evaporation	Total Amount	3·162 inches
Electricity ...	Number of Days Lightning	5
Cloudy Sky ...	Mean Amount	6·4
	Number of Clear Days ...	1
Meteors ...	Number observed ...	2

Remarks.

The temperature rose to 89·4 on the 4th, but the mean for the month was 1·1 below the average. The rainfall this month has been generally light inland, and moderate along the coast and northern districts; at Sydney it was 1·872 below the average. The rain has fallen lightly, as may be seen by the number of days on which it fell.

GOVERNMENT OBSERVATORY, SYDNEY.

LATITUDE, 33° 51′ 41″; LONGITUDE, 10h 4m 50·81s; MAGNETIC VARIATION, 9° 35′ 37″ East.

DECEMBER, 1881.—GENERAL ABSTRACT.

Barometer ... At 32° Faht.	Highest Reading... ...	30·017 on the 3rd, at 8 a.m.
	Lowest Reading	29·283 on the 28th, at 4 p.m.
	Mean Height	29·692

(Being 0·053 inch less than that in the same month on an average of the preceding 22 years.)

Wind	Greatest Pressure ...	24·5 lbs. on the 19th.
	Mean Pressure	0·9 lb.
	Number of Days Calm ...	0
	Prevailing Direction ...	N.E.

(Prevailing direction during the same month for the preceding 22 years, N.E.)

Temperature	Highest in the Shade ...	91·1 on the 28th.
	Lowest in the Shade ...	54·6 on the 4th.
	Greatest Range	26·3 on the 6th.
	Highest in the Sun ...	155·3 on the 6th.
	Lowest on the Grass ...	46·8 on the 13th.
	Mean Diurnal Range ...	13·2
	Mean in the Shade ...	70·0

(Being 0·4 greater than that of the same month on an average of the preceding 22 years.)

Humidity ...	Greatest Amount ...	93·0 on the 17th.
	Least	34·0 on the 28th.
	Mean	69·5

(Being 0·4 less than that of the same month on an average of the preceding 22 years.)

Rain	Number of Days... ...	10
	Greatest Fall	1·141 inches on the 20th.
	Total Fall...	1·060 „ 65 ft. above ground.
		1·613 „ 15 in. above ground.

(Being 0·608 inch less than that of the same month on an average of the preceding 22 years.)

Evaporation	Total Amount	4·768 inches.
Electricity ...	Number of Days Lightning	5
Cloudy Sky ...	Mean Amount	5·5
	Number of Clear Days ...	3
Meteors ...	Number observed ...	0

Remarks.

The temperature this month has been moderate and the weather generally very dry. The rainfall this month has been very light, excepting at a few coast stations. Inland, none at all fell in some places, and no less than 88 of the stations recorded less than half an inch.

LIST OF PUBLICATIONS.

TRANSACTIONS OF THE PHILOSOPHICAL SOCIETY OF NEW SOUTH WALES, 1862-1865.

CONTENTS.

TRANSACTIONS OF THE ROYAL SOCIETY OF NEW SOUTH WALES, 1867.

Vol. I.

CONTENTS.

TRANSACTIONS OF THE ROYAL SOCIETY OF NEW SOUTH WALES, 1868.

Vol. II.

CONTENTS.

TRANSACTIONS OF THE ROYAL SOCIETY OF NEW SOUTH WALES, 1869.

Vol. III.

CONTENTS.

TRANSACTIONS OF THE ROYAL SOCIETY OF NEW SOUTH WALES, 1870.

Vol. IV.

CONTENTS.

TRANSACTIONS OF THE ROYAL SOCIETY OF NEW SOUTH WALES, 1871.

Vol. V.

Contents.

TRANSACTIONS OF THE ROYAL SOCIETY OF NEW SOUTH WALES, 1872.

Vol. VI.

Contents.

TRANSACTIONS OF THE ROYAL SOCIETY OF NEW SOUTH WALES, 1873.

Vol. VII.

CONTENTS.

Article	Title	Author
Article I.	—Anniversary Address, by the Rev. W. B. Clarke, M.A., Vice-President.	
„ II.	—Appendix to the Anniversary Address, by the Rev. W. B. Clarke, M.A., Vice-President.	
„ III.	—On the Solution of certain Geodesic Problems	Martin Gardiner, C.E.
„ IV.	—Local Particulars of the Transit of Venus	H. C. Russell, B.A.
„ V.	—Note on the Bingera Diamond District	Arch. Liversidge, F.C.S.
„ VI.	—On our Coal and Coal Ports	James Manning.
„ VII.	—Appendix to "On our Coal and Coal Ports"	James Manning.
„ VIII.	—On our Coal and Coal Ports	James Manning.
„ IX.	—The Mammals of Australia and their Classification. Part I. Ornithodelphia and Didelphia	Gerard Krefft.
„ X.	—On Geodesic Investigations	Martin Gardiner, C.E.

TRANSACTIONS OF THE ROYAL SOCIETY OF NEW SOUTH WALES, 1874.

Vol. VIII.

CONTENTS.

Article	Title	Author
Article I.	—Duplex Telegraphy	E. C. Cracknell, Esq.
„ II.	—Hospital Accommodation	A. Roberts, M.R.C.S.
„ III.	—Criminal Statistics of New South Wales, 1860, 1873	Chris. Rolleston.
„ IV.	—Description of Eleven new species of Terrestrial and Marine Shells, from north-east Australia	John Brazier, C.M.Z.S.
„ V.	—Iron Pyrites	J. Latta, Esq.
„ VI.	—Sydney Water Supply by Gravitation	James Manning, Esq.
„ VII.	—Nickel Minerals from New Caledonia...	Professor Liversidge.
„ VIII.	—Iron Ore and Coal Deposits at Wallerawang, N.S.W.	Professor Liversidge.
„ IX.	—Some of the Results of the Observation of the Transit of Venus in N.S.W....	H. C. Russell, B.A.
„ X.	—The Transit of Venus as observed at Eden	Rev. Wm. Scott, M.A.

TRANSACTIONS AND PROCEEDINGS OF THE ROYAL SOCIETY OF NEW SOUTH WALES, 1875.

Vol. IX.

CONTENTS.

(Edited by Professor Liversidge.)

Article	Title	PAGE.
Article I.	—List of Officers, Fundamental Rules, By-laws, and List of Members	i to xxix
„ II.	—Proceedings	xxxi to xlii
„ III.	—Additions to Library...	xliii to xlv

JOURNAL OF THE ROYAL SOCIETY OF NEW SOUTH WALES, 1876.

Vol. X.

CONTENTS.

(Edited by Professor Liversidge.)

JOURNAL OF THE ROYAL SOCIETY OF NEW SOUTH WALES, 1877.

Vol. XI.

CONTENTS.

(Edited by Professor Liversidge.)

JOURNAL OF THE ROYAL SOCIETY OF NEW SOUTH WALES, 1878.

Vol. XII.

CONTENTS.

(Edited by Prof. Liversidge and Dr. Leibius.)

PAPERS READ BEFORE THE SECTIONS.

JOURNAL OF THE ROYAL SOCIETY OF NEW SOUTH WALES, 1879.

Vol. XIII.

CONTENTS.

(Edited by Prof. Liversidge.)

JOURNAL OF THE ROYAL SOCIETY OF NEW SOUTH WALES 1880.

Vol. XIV.

CONTENTS.

(Edited by Prof. Liversidge.)

PAPER READ BEFORE THE MEDICAL SECTION.

JOURNAL OF THE ROYAL SOCIETY OF NEW SOUTH WALES, 1881.

Vol. XV.

CONTENTS.

(Edited by Prof. Liversidge.)

INDEX.

Sydney: Thomas Richards, Government Printer.—1882.

NOTICE.

MEMBERS of the Royal Society of New South Wales are informed that the Library will be open for consultation and for the issue of books on Wednesday afternoons from 4 to 6 p.m., and on the evenings of Monday, Wednesday, and Friday, from 7 to 10 p.m. during the session, and during the recess (January to end of April) on Wednesdays from 4–6 and 7–10 p.m.

PUBLICATIONS.

Certain of the following publications of the Society can be obtained at the Society's House in Elizabeth-street :—

Transactions of the Phil. Society of N.S.W.,					1862–6,	price,	10s. 6d.
Transactions of the Royal Society, N.S.W.,					1867,	price	5s., out of print.
,,	,,	,,	,,	,,	1868,	price	5s.
,,	,,	,,	,,	,,	1869,	,,	5s., out of print.
,,	,,	,,	,,	,,	1870,	,,	5s. ,,
,,	,,	,,	,,	,,	1871,	,,	5s. ,,
,,	,,	,,	,,	,,	1872,	,,	5s.
,,	,,	,,	,,	,,	1873,	,,	5s.
,,	,,	,,	,,	,,	1874,	out of print.	
Transactions and Proceedings			,,	,,	1875,	price	7s. 6d., out of print.
Journal	,,	,,	,,	,,	1876,	,,	10s. 6d.
,,	,,	,,	,,	,,	1877,	,,	10s. 6d.
,,	,,	,,	,,	,,	1878,	,,	10s. 6d.
,,	,,	,,	,,	,,	1879,	,,	10s. 6d.
,,	,,	,,	,,	,,	1880,	,,	10s. 6d.
,,	,,	,,	,,	,,	1881,	,,	10s. 6d.